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STUDIES IN ATMOSPHERIC POLLEN.

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THE importance of pollen in the study of hay fever and asthma needs no emphasis. The problem has no general solution, but varies from place to place, according to the common pollen types. A knowledge of the latter and of their relative abundance greatly assists the physician in his treatment of these diseases. The problem has been widely studied in the United States of America, and introductory studies have been made in Melbourne and Adelaide.

The present investigation is being carried out in the Department of Botany of the University of Sydney, and is financed by the New South Wales Department of Public Health. Its aim is to investigate the frequency of various pollen types in Sydney and the surrounding country districts, to determine seasonal variations, and to attempt a correlation of pollen counts with meteorological data. It is less than one year since the work began, and this paper describes only the technique and procedure and some preliminary results.

Historical.

The importance of pollen as a cause of hay fever was established in England by Blackley (1873, 1880), and it was he who carried out the first series of experiments on the pollen content of the atmosphere. He exposed, for periods of twenty-four hours, slides coated with an adhesive mixture of the following proportions: "1 part water, 2 parts proof spirit, 1 part glycerine, 5 grains pure carbolic acid per oz."

Blackley estimated the pollen content of the atmosphere and concluded that grass pollen was the most important

type present. By attaching slides to kites he was able also to determine the pollen content at heights up to 1,500 feet, and stated that it was higher than at ground level. He noticed also that the pollen count was reduced almost to zero by a fall of rain.

The importance of Blackley's work was not recognized for some time, owing to the popularity of the nasal and bacterial theories of the cause of hay fever. It was not until 1903 that the work of Dunbar renewed interest in the pollen theory, to be followed in 1911 by the establishment of active immunization therapy by Noon. Since that time the problem has been widely studied, especially in North America, where the prevalence of ragweed makes it one of great urgency.

Scheppegrell (1922) described the use of slides or plates covered with "Vaseline" or some other adhesive substance to trap pollen, and also deduced a formula based on Stokes's law for calculating the pollen content of the air in terms of the number of grains per cubic yard. This has been the basis of many subsequent investigations, notably those of Durham (1924, 1928, 1929, 1930, 1931, 1932, 1933, 1935, 1937), Koessler and Durham (1926), Duke and Durham (1928), Duke (1931), Balyeat (1927), Rowe (1928), Thommen (Coca, Walzer and Thommen, 1931), Detweiler and Hurst (1930), Acquarone and Gay (1931), Patterson and Gay (1932), Wodehouse (1933), Barrett (1934), Deamer and McMinn (1935), and McDermott and Howell (1936). Especially notable is the work of Durham, who has carried out most extensive investigations, covering several years, throughout the United States of America and in parts of Canada and Mexico (1935). Thus the limits of the ragweed area have been defined (1933), and numerous cities have been compared from the point of view of exposure to pollen (1929, 1931, 1937); also some correlation has been established between pollen counts, weather data and hay fever symptoms (1931).

It was observed that a horizontal slide exposed to the weather and washed by rain would lose any pollen which

had been collected; and many workers devised shelters to protect the slide. It was also found that the exposure of slides on window ledges and in similar situations led to very inaccurate results, since wind eddies caused considerable variation in pollen count even within a few feet. The exposure of slides in a specially constructed weather vane was described by Penfound and Efron (1930); a more primitive instrument was used at the same time by Wilmer and Cobe (1930). Miss La Rush (1934) produced a similar effect by exposing one horizontal and four vertical slides under a specially constructed shelter, the vertical slides facing the four points of the compass to eliminate the effect of wind movement. The use of a vertical slide has been criticized by several workers, notably Durham (1930), and Thommen (Coca, Walzer and Thommen, 1931), on the ground that the wind will tend to sweep round the slide and deposit pollen only on the back.

The pollen content of the atmosphere at a height has been studied by Scheppegegrell (1924), and later by MacQuiddy (1935) and Durham (1932), who exposed slides on aeroplanes at known heights. Zifferblatt and Seelaus (1935), discarding this method, produced a special apparatus for making such tests. Barrett (1932) studied the effect of exposing slides on different types of moving vehicles; Duke (1928) investigated the pollen content of the air in a closed room, while Cocke (1937, 1938) devised an apparatus which measured directly the pollen content of the air.

In many cases the adhesive substance used on the slides was "Vaseline"; more recently this has been superseded by glycerin jelly, recommended by Wodehouse (1935). Many workers consider staining of the pollen grains unnecessary; methyl green has been widely used by others; but the best stain seems to be basic fuchsin, which brings out very clearly the details of the exine and has the added advantage of being permanent.

Work in Australia.

Very little of this work has been done in this country so far. A pollen survey has been carried out in Melbourne (Sharwood, 1935, 1937); by means of a primitive wind-vane, the principal types of pollen in this city were determined, and a relationship between pollen count, rainfall, humidity and north winds was demonstrated. In Adelaide a survey has been carried out by Mercer (1939); the pollination seasons of the principal types have been indicated by means of graphs, methods of staining and counting have been described, and the effect of certain weather factors has been noted.

Technique of the Present Investigation.

In this investigation, pollen counts were obtained by exposing to the atmosphere slides coated with glycerin jelly to which basic fuchsin was added as described by Wodehouse (1935). Some difficulty was experienced in producing a suitable formula for the jelly, since if a mixture of reasonably high melting point is used there is a tendency for the substance to become dry and leathery, and more jelly must be added when the cover slip is attached. On the other hand, a jelly of low melting point is too hygroscopic when rain or dew is present, and melts easily, especially if sent through the post on a hot day. The following formula is now in use in this investigation: 40 parts of gelatin, 100 parts of glycerin, 100 parts of water, 2.5 parts of formalin, 14 parts of a saturated solution of aqueous basic fuchsin. This mixture has a melting point of 98° F. and remains moist for a considerable period.

A small area in the centre of each slide is coated with jelly by means of a slide turntable and a camel hair brush. The area covered is approximately 0.5 centimetre in diameter, and is later covered by a number 1 cover slip of this size. While the use of this small area somewhat decreases the accuracy of the observations, it greatly increases the ease of packing and handling the slides.

The instrument in which the slides are exposed consists of a bicycle hub (1) attached vertically to a rod 10 inches long and one-quarter of an inch thick (2), fitted onto a wooden base measuring 18 by 10 inches (3). The shelter for the slides is attached to the rod; this shelter has a galvanized iron floor 8 by 5 inches in area, with

a rounded hood (4) measuring 12 by 12 inches with curved ends, fitted onto the base. The main supporting rod passes through the centre of the floor and hood and joins the tail (5) six or seven inches above. Slide holders (6, 7) are fitted onto the floor of the shelter in slotted grooves; the slides are held by rubber clips, which prevent them from being dislodged even in a high wind. The horizontal slide (6) is raised about one inch from the floor by means of an L-shaped clip, so that rain will not flow over it even if the floor becomes wet. The two slide holders are placed about one inch from the back of the shelter, to prevent rain from reaching them easily even on windy days. The tail is attached to the top of the one-quarter inch metal rod; it fits into a slit in the rod and is attached by two screws (8). The tail measures

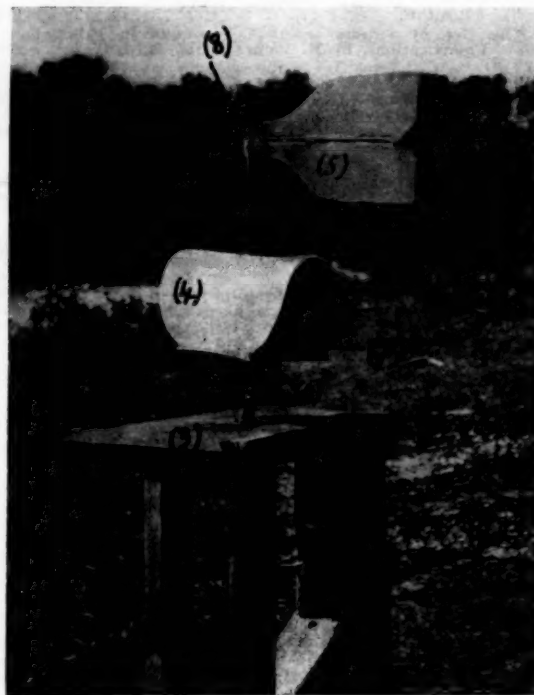


FIGURE I.
Photograph of the apparatus for collecting pollen.

14 by 6 inches and has for rigidity a rod one-eighth of an inch in thickness along the centre. The bicycle hub is adjusted to give the correct sensitivity, so that the instrument will respond to light breezes, but not so readily as to spin round and round too rapidly to catch pollen.

Two slides, horizontal and vertical, are exposed simultaneously for twenty-four hours, and are changed each morning at approximately 9 o'clock. The slide is then heated gently and a coverslip is placed on the spot of jelly. The pollen grains under the coverslip are later counted and identified with the aid of a mechanical stage. The area thus counted is 1.33 square centimetres, and the reading is subsequently reduced to a standard area of 1.0 square centimetre.

Although various workers have criticized the use of a vertical slide, stating that air currents will tend to sweep round it, depositing pollen on the back rather than on the front, results of this investigation indicate that such a criticism is not justified. Pollen counts on the vertical slide are generally much higher than the corresponding horizontal readings. In fact, although the variations in horizontal readings agree in the main with those in vertical readings, they are frequently within the limits of experimental error. To cover horizontal slides with a

shelter may slightly lower the readings, yet without a shelter they are almost valueless, since a moderate shower of rain may completely remove the jelly from the slides. The exposure of a horizontal slide is therefore of little value, and has been discontinued.

The layer of jelly is made as thin as possible, in order to facilitate counting. If the slide is washed by rain or dew, or the jelly becomes to some extent dried, it may be necessary to add a small drop of jelly when the coverslip is being put on.

Accuracy of the Method.

The distribution of pollen in the atmosphere is not uniform, either from day to day or from place to place. The method must be sufficiently accurate to record the major variations, but it will obviously be subject to minor errors. Earlier workers have suggested that the method is unsatisfactory because of the variation in counts on slides exposed a short distance apart. If slides are exposed horizontally on a window ledge this is doubtless true. In the present work, however, care has been taken to ensure uniform conditions (i) by the use of a weather vane at each station, (ii) by the placing of the instrument well off the ground and as far as possible from nearby buildings.

Identification of Pollen.

While keys for the identification of pollen grains, such as that given by Wodehouse (1935), are most useful, the formation of a type collection was found essential. As the different species came into flower, slides of pollen were prepared, or pollen was removed from herbarium specimens; new types were finally identified by comparison with known pollen.

Selection of Stations.

The work aims at a study of fluctuations in pollen counts within the Sydney metropolitan area and in the surrounding country districts of New South Wales. Up to the end of 1940, six stations had been established in the city and five in other districts. The Sydney stations were selected as far as possible to be representative of the whole metropolitan area; they are at the University of Sydney, the Sydney Weather Bureau, Wahroonga, Parramatta, Manly and Bexley. Other stations were established at Moss Vale, Canberra, Newcastle, Blackheath and Campbelltown (see Table I).

At each station slides are exposed daily in the manner described above. They are then put in a special box and posted to the University, where the coverslips are placed in position and the counts made. A box is sent to the University from each station every twelve days. Prepared slides are sent in similar boxes to the stations. Readings from most stations have been missed from time to time as a result of breakages in the post and other causes.

Results.

From September 1 to December 31, 1940, regular counts indicated two distinct pollen seasons: (i) the spring or tree season, (ii) the summer or grass and plantain season. Experimental counts made in Sydney prior to September 1 indicated that in July and August both *Casuarinas* and conifers shed pollen heavily. These types of pollen were followed by pollen from deciduous trees, such as oak, willow and poplar. A few trees, such as *Brachychiton* (the Kurrajong), shed their pollen later in the season. Throughout the summer grass and plantain were the most common types; and the opinion of medical men indicates

TABLE I.

Location and Date of Instalment.	Position of Instrument.	Height from Ground. (Feet.)	Comment.
University 1/9/40.	Roof of Geology Department.	70	Results may be regarded as representative of the metropolitan area. A high proportion of tree pollen, due to ornamental trees—oak, willow, poplar <i>et cetera</i> .
Wahroonga 1/9/40.	Roof of shed in private garden.	10	Count fairly low. High proportion of miscellaneous pollen due to flower gardens. High counts of conifers, Myrtaceae and <i>Casuarina</i> due to trees in vicinity.
Parramatta 12/9/40.	Chapel tower of The King's School.	60	Count moderate. High proportion of pine and kurrajong. Count of Proteaceae due to ornamental trees.
Bexley 21/10/40.	Roof of block of flats.	60	Continual high counts; large proportion of plantain, due to thick growth of the weed on waste land. <i>Aceria</i> and <i>Chenopodium</i> noticeable. Much hay fever reported.
Manly 7/9/40.	Fence in grounds of St. Patrick's College.	5	Counts low. Grass predominant; very little plantain. Cupressaceae and <i>Casuarina</i> noticeable. Instrument previously situated at Manly District Hospital; count of <i>Antirrhinum</i> due to flower bed close by; this type disappeared on removal of station to St. Patrick's College.
Sydney Weather Bureau 7/11/40.	Roof of building.	70	Typical of city area. Grass and <i>Casuarina</i> high. Oak and willow absent as result of delay in beginning readings.
Moss Vale.	Post in private garden.	10	Heavy grass count; plantain also high. High count of willow and small proportion of maple due to nearby trees.
Canberra.	Roof of Parliament House.	40	High count of Cyperaceae probably from sedges on banks of Molonglo River. Cupressaceae high, owing to ornamental trees. Grass abundant.
Newcastle.	Roof of building near beach.	70	Counts very low. Grass pollen is the most important.
Blackheath.	Fence in private garden.	5	Only a few days' counts completed. Grass pollen very abundant; Myrtaceae high, from surrounding trees. Plantain almost completely absent.
Campbelltown.	Roof of shed in private garden.	10	Counts low, mainly grass and plantain. Maize pollen noticeable towards end of December.

TABLE II.

Date.	Gramineae.	Cupressaceae.	Pinus.	Cyperaceae.	Casuarina.	Quercus.	Plantago.	Acacia.	Salix.	Myrtaceae.	Populus.	Ulmus.	Oleaceae.	Chenopodiaceae.	Proteaceae.	Compositae.	Taraxacum.	Brechychiton.	Ceratopetalum.
September, 1940—																			
1 ..	x	x	x	x	x	x	x								x	x			
2 ..	x	x	x	x		x													
3 ..	x	x	x	x		x													
4 ..	x	x	x	x		x													
5 ..	x	x	x	x		x													
6 ..	x	x	x	x		x													
7 ..	x	x	x	x		x													
8 ..	x	x	x	x		x													
9 ..	x	x	x	x		x													
10 ..	x	x	x	x		x													
11 ..	x	x	x	x		x													
12 ..	x	x	x	x		x													
13 ..	x	x	x	x		x													
14 ..	x	x	x	x		x													
15 ..	x	x	x	x		x													
16 ..	x	x	x	x		x													
17 ..	x	x	x	x		x													
18 ..	x	x	x	x		x													
19 ..	x	x	x	x		x													
20 ..	x	x	x	x		x													
21 ..	x	x	x	x		x													
22 ..	x	x	x	x		x													
23 ..	x	x	x	x		x													
24 ..	x	x	x	x		x													
25 ..	x	x	x	x		x													
26 ..	x	x	x	x		x													
27 ..	x	x	x	x		x													
28 ..	x	x	x	x		x													
29 ..	x	x	x	x		x													
30 ..	x	x	x	x		x													
October, 1940—																			
1 ..	x	x				x													
2 ..	x	x				x													
3 ..	x	x				x													
4 ..	x	x				x													
5 ..	x	x				x													
6 ..	x	x				x													
7 ..	x	x				x													
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26 ..	x	x				x													
27 ..	x	x				x													
28 ..	x	x				x													
29 ..	x	x				x													
30 ..	x	x				x													
November, 1940—																			
1 ..	x	x				x													
2 ..	x	x				x													
3 ..	x	x				x													
4 ..	x	x				x													
5 ..	x	x				x													
6 ..	x	x				x													
7 ..	x	x				x													
8 ..	x	x				x													
9 ..	x	x				x													
10 ..	x	x				x													
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25 ..	x	x				x													
26 ..	x	x				x													
27 ..	x	x				x													
28 ..	x	x				x													
29 ..	x	x				x													
30 ..	x	x				x													

TABLE II.—Continued.

Date.	Gramineae.	Cyperaceae.	Phus.	Cyperaceae.	Cucurbitina.	Quercus.	Plantago.	Acacia.	Salix.	Myrtaceae.	Populus.	Ulmus.	Oleaceae.	Chenopodiales.	Proteaceae.	Compositae.	Taraxacum.	Brachycthon.	Cerantopetalum.
December, 1940—																			
1 ..	x	x		x			x			x			x					x	
2 ..	x	x		x			x			x			x					x	
3 ..	x	x		x			x			x			x					x	
4 ..	x	x		x			x			x			x					x	
5 ..	x	x		x			x			x			x					x	
6 ..	x	x		x			x			x			x					x	
7 ..	x	x		x			x			x			x		x			x	
8 ..	x	x		x			x			x			x			x		x	
9 ..	x	x	x	x			x			x			x					x	
10 ..	x	x	x	x			x			x			x					x	
11 ..	x	x		x			x			x			x					x	
12 ..	x	x		x			x			x			x					x	
13 ..	x	x	x	x			x			x			x					x	
14 ..	x	x		x			x			x			x					x	
15 ..	x	x	x	x			x			x			x					x	
16 ..	x	x		x			x			x			x					x	
17 ..	x	x		x			x			x			x					x	
18 ..	x	x		x			x			x			x					x	
19 ..	x	x		x			x			x			x					x	
20 ..	x	x		x			x			x			x					x	
21 ..	x	x		x			x			x			x					x	
22 ..	x	x		x			x			x			x					x	
23 ..	x	x		x			x			x			x					x	
24 ..	x	x		x			x			x			x					x	
25 ..	x	x		x			x			x			x					x	
26 ..	x	x		x			x			x			x					x	
27 ..	x	x		x			x			x			x					x	
28 ..	x	x		x			x			x			x					x	
29 ..	x	x		x			x			x			x					x	
30 ..	x	x		x			x			x			x					x	
31 ..	x	x		x			x			x			x					x	

that these, among pollen, are the most usual causes of hay fever. It remains to be seen whether the autumn is characterized by weed pollen as in America; certainly no pollen has appeared to date which compares in importance with the American ragweed. The results for different stations are summarized in Table I.

It has been noticed that some types of pollen, especially the Myrtaceae, Oleaceae and Compositae, tend to group together on the slides. Obviously, if each grain is counted separately, the importance of that particular type will be exaggerated; therefore in calculating percentages each group has been treated as a single grain.

Comparison of Pollen Counts and Weather Data.

Complete weather reports have been obtained from the Sydney Weather Bureau and from the Commonwealth Forestry Bureau, Canberra. In addition, some weather data from country stations are supplied by the Sydney Weather Bureau. These results, together with average pollen counts from different stations, are summarized in Figure II. The details are shown in Tables IIIA to IIIC. From an inspection of the figure, the following comments may be made.

Rainfall.—The effect of rainfall is the most obvious. A heavy fall of rain is followed at once by a drop in the pollen count, usually almost to zero. Very light showers affect the pollen count to a much less extent. In some cases rain does not affect the count; but on further investigation it is usually found that in such case the rain has fallen during the night or in the late afternoon, while most pollen is shed during the morning. Often the effect of heavy rain is to produce a great increase in the pollen crop after a few days.

Sunshine.—Sunshine also has a very noticeable effect on the pollen count. On days when there is no rain but little sun, the pollen count is low. Sunshine lowers the humidity and also causes the anthers to shed their pollen.

Temperature.—The graph shows both maximum and minimum temperatures. The maximum seems to have a greater effect on the pollen count, but the effect of temperature is to a large extent obscured on the graph by that of sunshine, since high temperatures generally occur on sunny days.

Wind.—The prevailing direction of the wind for each day is recorded, and the velocity is expressed as the number of miles per day. In general it seems that a high wind velocity increases the pollen count, both directly

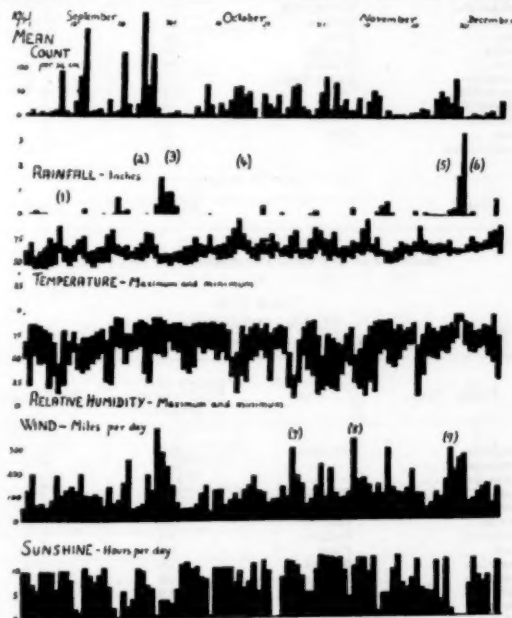


FIGURE II.

Graph showing relation of pollen count at University to weather data, September 1 to December 9, 1940. Note increase in count due to absence of rain, high temperature, low humidity and much sunshine, shown at (1), (2), (4), (5); also decrease in count due to rain, (3), (6), and accompanied by low temperature, high humidity and little sunshine. A high wind, when accompanied by fine weather, causes a rise in the count, as seen at (7), (8), (9).

by carrying pollen and indirectly by lowering the humidity. The effect of wind direction has not yet been studied in detail.

Humidity.—The graph records both maximum and minimum values of the relative humidity. Of these, the minimum is more important, since it generally occurs during the day and marks the most favourable time for the deposition of pollen on the slides. The effect of humidity on the pollen count is not clearly seen from the graphs; it seems probable that during very humid days the pollen does not move far, since it becomes moist and hence less buoyant. However, humidity itself is readily affected by the four other weather factors studied, and therefore its effect on the pollen count is not obvious from such graphs, and will have to await further analysis.

Definition of "Pollen Type".

In several cases it has proved impossible to identify pollen of different genera belonging to one family. In other cases, for example, *Plantago* and *Pinus*, the genus possesses a distinctive pollen. Hence in the following list of pollen types some represent genera while others include the whole family.

TABLE IIIA.
Station: University.
Date of First Count: September 1, 1940.

Pollen Type.	Common Name.	Number on 2-66 Square Centimetres.	Percentage.
Gramineae	Grasses.	3,532	36.8
<i>Quercus</i>	Oak.	1,359	14.2
<i>Plantago</i>	Plantain.	1,109	11.6
Cupressaceae	—	796	8.3
Myrtaceae	—	740	7.8
Oleaceae	—	464	4.8
<i>Salix</i>	Willow.	280	2.9
<i>Casuarina</i>	Sheoak.	226	2.4
<i>Brachychiton</i>	Kurrajong.	190	2.0
Cyperaceae	Sedges.	151	1.6
<i>Pinus</i>	Pine.	90	0.9
<i>Populus</i>	Poplar.	30	0.3
<i>Acacia</i>	Wattle.	18	0.2
<i>Taraxacum</i>	Dandelion.	16	0.2
Chenopodiales	—	11	0.1
Compositae	—	9	0.1
Proteaceae	—	1	—
<i>Ulmus</i>	Elm.	1	—
Miscellaneous	—	560	5.8
Total .. ..	.. ..	9,593	100.0

Number of days: 121.
Mean count per square centimetre per day: 33.

TABLE IIIB.
Station: Wahroonga.
Date of First Count: September 1, 1940.

Pollen Type.	Common Name.	Number on 2-66 Square Centimetres.	Percentage.
Gramineae	Grasses.	1,313	36.0
Myrtaceae	—	649	17.8
Cupressaceae	—	444	12.2
<i>Plantago</i>	Plantain.	303	8.3
Oleaceae	—	137	3.8
<i>Quercus</i>	Oak.	108	3.0
Cyperaceae	Sedges.	85	2.3
<i>Pinus</i>	Pine.	68	1.9
<i>Casuarina</i>	Sheoak.	50	1.4
<i>Populus</i>	Poplar.	26	0.7
<i>Salix</i>	Willow.	19	0.5
<i>Acacia</i>	Wattle.	14	0.4
Proteaceae	—	8	0.2
Compositae	—	4	0.1
Chenopodiales	—	3	0.1
<i>Taraxacum</i>	Dandelion.	1	—
Miscellaneous	—	411	11.3
Total .. ..	.. ..	3,646	100.1

Number of days: 120.
Mean count per square centimetre per day: 11.

TABLE IIIC.
Station: Parramatta.
Date of First Count: September 12, 1940.

Pollen Type.	Common Name.	Number on 2-66 Square Centimetres.	Percentage.
Gramineae	Grasses.	1,219	31.2
<i>Pinus</i>	Pine.	1,054	27.0
<i>Plantago</i>	Plantain.	428	11.0
Cupressaceae	—	298	7.6
Myrtaceae	—	160	4.0
<i>Casuarina</i>	Sheoak.	144	3.7
<i>Brachychiton</i>	Kurrajong.	107	2.7
<i>Quercus</i>	Oak.	91	2.3
<i>Salix</i>	Willow.	58	1.5
Proteaceae	—	48	1.2
Cyperaceae	Sedges.	40	1.0
Oleaceae	—	36	0.9
Chenopodiales	—	15	0.4
<i>Acacia</i>	Wattle.	6	0.2
Compositae	—	3	0.1
<i>Taraxacum</i>	Dandelion.	2	0.1
<i>Ulmus</i>	Elm.	1	—
Miscellaneous	—	168	4.3
Total .. ..	.. ..	3,908	100.1

Number of days: 111.
Mean count per square centimetre per day: 13.

TABLE IIID.
Station: Bexley.
Date of First Count: October 21, 1940.

Pollen Type.	Common Name.	Number on 2-66 Square Centimetres.	Percentage.
Gramineae	Grasses.	3,456	50.8
<i>Plantago</i>	Plantain.	1,864	27.4
Myrtaceae	—	329	4.8
Cupressaceae	—	306	4.5
Oleaceae	—	232	3.4
<i>Casuarina</i>	Sheoak.	121	1.8
<i>Quercus</i>	Oak.	53	0.8
Cyperaceae	Sedges.	34	0.5
Chenopodiales	—	34	0.5
<i>Brachychiton</i>	Kurrajong.	26	0.4
<i>Acacia</i>	Wattle.	29	0.4
Compositae	—	24	0.4
<i>Pinus</i>	Pine.	10	0.2
<i>Taraxacum</i>	Dandelion.	9	0.1
Proteaceae	—	1	—
Miscellaneous	—	280	4.1
Total .. ..	.. ..	6,808	100.1

Number of days: 72.
Mean count per square centimetre per day: 36.

TABLE IIIE.
Station: Manly.
Date of First Count: September 7, 1940.

Pollen Type.	Common Name.	Number on 2-66 Square Centimetres.	Percentage.
Gramineae	Grasses.	1,557	65.1
Cupressaceae	—	321	13.4
<i>Casuarina</i>	Sheoak.	104	4.4
<i>Antirrhinum</i>	Snapdragon.	83	3.5
Myrtaceae	—	71	3.0
<i>Plantago</i>	Plantain.	44	1.8
<i>Pinus</i>	Pine.	41	1.7
Cyperaceae	Sedges.	23	1.0
<i>Salix</i>	Willow.	13	0.5
Oleaceae	—	9	0.4
Chenopodiales	—	6	0.3
Compositae	—	5	0.2
<i>Acacia</i>	Wattle.	5	0.2
Proteaceae	—	4	0.2
<i>Brachychiton</i>	Kurrajong.	4	0.2
<i>Taraxacum</i>	Dandelion.	3	0.1
Proteaceae	—	1	—
Miscellaneous	—	98	4.1
Total .. ..	.. ..	2,362	100.1

Number of days: 82.
Mean count per square centimetre per day: 11.

TABLE IIII.

Station: Weather Bureau.
Date of First Count: November 7, 1940.

Pollen Type.	Common Name.	Number on 2.66 Square Centimetres.	Percentage.
Gramineæ	Grasses.	1,894	60.0
Casuarina	Sheoak.	335	10.6
Plantago	Plantain.	286	9.1
Myrtaceæ	—	254	8.1
Cupressaceæ	—	144	4.6
Brachychiton	Kurrajong.	49	1.6
Cyperaceæ	Sedges.	36	1.1
Chenopodiales	—	28	0.9
Oleaceæ	—	22	0.7
Taraxacum	Dandelion.	11	0.4
Compositæ	—	9	0.3
Acacia	Wattle.	7	0.2
Pinus	Pine.	4	0.1
Miscellaneous	—	77	2.4
Total .. ..	.. ..	3,156	100.1

Number of days: 55.

Mean count per square centimetre per day: 21.

TABLE IIII.

Station: Moss Vale.
Date of First Count: September 22, 1940.

Pollen Type.	Common Name.	Number on 2.66 Square Centimetres.	Percentage.
Gramineæ	Grasses.	3,827	51.8
Salix	Willow.	1,847	25.0
Plantago	Plantain.	904	12.2
Cupressaceæ	—	211	2.9
Pinus	Pine.	105	1.4
Myrtaceæ	—	62	0.8
Compositæ	—	43	0.6
Cyperaceæ	Sedges.	34	0.5
Quercus	Oak.	34	0.5
Chenopodiales	—	30	0.4
Oleaceæ	—	29	0.4
Brachychiton	Kurrajong.	28	0.4
Acacia	Wattle.	27	0.4
Acer	Maple.	25	0.3
Taraxacum	Dandelion.	18	0.2
Casuarina	Sheoak.	17	0.2
Miscellaneous	—	154	2.1
Total .. ..	.. ..	7,395	100.1

Number of days: 31.

Mean count per square centimetre per day: 81.

TABLE IIII.

Station: Canberra.
Date of First Count: October 23, 1940.

Pollen Type.	Common Name.	Number on 2.66 Square Centimetres.	Percentage.
Cyperaceæ	Sedges.	1,298	30.1
Gramineæ	Grasses.	1,115	25.8
Cupressaceæ	—	990	22.9
Myrtaceæ	—	321	7.4
Plantago	Plantain.	145	3.4
Pinus	Pine.	114	2.6
Quercus	Oak.	87	2.0
Oleaceæ	—	28	0.7
Casuarina	Sheoak.	23	0.5
Ulmus	Elm.	15	0.4
Taraxacum	Dandelion.	14	0.3
Brachychiton	Kurrajong.	11	0.3
Compositæ	—	9	0.2
Acacia	Wattle.	9	0.2
Chenopodiales	—	9	0.2
Salix	Willow.	5	0.1
Miscellaneous	—	126	2.9
Total .. ..	.. ..	4,319	100.0

Number of days: 58.

Mean count per square centimetre per day: 28.

TABLE IIII.

Station: Newcastle.
Date of First Count: October 18, 1940.

Pollen Type.	Common Name.	Number on 2.66 Square Centimetres.	Percentage.
Gramineæ	Grasses.	770	55.8
Cupressaceæ	—	169	12.9
Plantago	Plantain.	112	8.6
Myrtaceæ	—	88	6.7
Casuarina	Sheoak.	43	3.3
Brachychiton	Kurrajong.	17	1.3
Cyperaceæ	Sedges.	15	1.2
Chenopodiales	—	6	0.5
Pinus	Pine.	3	0.2
Acacia	Wattle.	3	0.2
Quercus	Oak.	2	0.1
Compositæ	—	1	0.1
Miscellaneous	—	81	6.2
Total .. ..	.. ..	1,310	100.1

Number of days: 75.

Mean count per square centimetre per day: 6.

TABLE IIII.

Station: Campbelltown.
Date of First Count: November 5, 1940.

Pollen Type.	Common Name.	Number on 2.66 Square Centimetres.	Percentage.
Gramineæ	Grasses.	390	48.0
Plantago	Plantain.	153	18.8
Brachychiton	Kurrajong.	84	10.3
Myrtaceæ	—	46	5.7
Cyperaceæ	Sedges.	41	5.0
Cupressaceæ	—	21	2.6
Casuarina	Sheoak.	14	1.7
Quercus	Oak.	4	0.5
Oleaceæ	—	4	0.5
Chenopodiales	—	4	0.5
Proteaceæ	—	4	0.5
Taraxacum	Dandelion.	3	0.4
Pinus	Pine.	2	0.3
Compositæ	—	2	0.3
Acacia	Wattle.	1	0.1
Miscellaneous	—	40	4.9
Total .. ..	.. ..	813	100.1

Number of days: 50.

Mean count per square centimetre per day: 6.

TABLE IIII.

Station: Blackheath.
Date of First Count: December 6, 1940.

Pollen Type.	Common Name.	Number on 2.66 Square Centimetres.	Percentage.
Gramineæ	Grasses.	598	79.2
Myrtaceæ	—	59	7.8
Casuarina	Sheoak.	29	3.8
Cupressaceæ	—	16	2.1
Brachychiton	Kurrajong.	15	2.0
Plantago	Plantain.	12	1.6
Quercus	Oak.	3	0.4
Taraxacum	Dandelion.	3	0.4
Pinus	Pine.	1	0.1
Acacia	Wattle.	1	0.1
Miscellaneous	—	18	2.4
Total .. ..	.. ..	755	99.0

Number of days: 18.

Mean count per square centimetre per day: 16.

Notes on Principal Pollen Types.

Gramineæ.—Grass pollen formed by far the highest proportion of the total count during the period from September to December, 1940. A small amount of pollen was noticed in experimental counts as early as July; this probably came from the winter grass, *Poa annua*, which

was shedding pollen at that time. In October the count rose and was maintained at a high level until the end of December. The percentage of grass pollen varied from 77.5 at Blackheath to 25.8 at Canberra; total percentage counts of grass over the three-month period were as follows:

Blackheath	77.5
Manly	65.1
Weather Bureau	60.0
Newcastle	55.8
Moss Vale	51.8
Bexley	50.8
Campbelltown	48.0
University	36.8
Wahroonga	36.0
Parramatta	31.2
Canberra	25.8

These figures give no indication of the absolute amounts of grass pollen. At Blackheath there does seem to be more grass pollen than at other stations, but at Manly and Newcastle the high percentage simply indicates lack of other pollen; and at the University and Canberra the low percentage is increased if abnormally high counts of other pollen are disregarded. No attempt has been made so far to distinguish different grass pollen, except in the case of maize, the pollen of which is easily recognized by its great size. It may be possible also to separate the smaller grass pollen from the larger—for example, *Lolium perenne* (rye grass) from *Poa annua*. The former seems very important as a cause of hay fever. Certainly much of the grass pollen caught on the slides appeared to be from this species; but no definite figure can be given as yet. Grasses are considered by medical men to cause the greatest number of cases of pollinosis in Sydney.

Plantago.—*Plantago lanceolata* is a very common weed about Sydney; *Plantago major* occurs rarely. The pollen began to appear on the slides in early spring and was shed abundantly during October, November and December; it decreased somewhat in amount towards the end of the last-mentioned month. Percentages found at different stations were as follows:

Bexley	27.4
Campbelltown	18.8
Moss Vale	12.2
University	11.6
Parramatta	11.0
Weather Bureau	9.1
Newcastle	8.6
Wahroonga	8.3
Canberra	3.4
Manly	1.8
Blackheath	1.6

The high percentage at Bexley certainly indicates abundant pollen; the weeds were seen growing there in great numbers and shedding pollen profusely. Campbelltown also showed a fairly high percentage; a good deal of plantain hay fever has been reported from this district. The Canberra percentage was low; and plantain was almost completely absent from Manly and Blackheath. This weed is generally considered to be second only to grass as a cause of hay fever in Sydney.

Cupressaceae.—Slides exposed during July and August showed a high count of Cupressaceae pollen; the readings were lower during the part of the year under consideration. A definite proportion of this pollen was still present in December; this is probably due in part to the number of ornamental trees of this family which have slightly different pollination periods, and partly to the lightness of the pollen, which enables it to be carried for long distances and to remain suspended in the air for some time. Several members of the Cupressaceae have been reported as causing pollinosis in different parts of America; the only one to which much attention has been paid by medical men in Australia is *Callitris* (Murray, western or cypress pine), which seems in many cases to be a cause of the disease. Other trees of this family which shed pollen very profusely warrant attention. The percentages were as follows:

Canberra	32.9
Manly	13.4
Newcastle	12.9
Wahroonga	12.2
University	8.3
Parramatta	7.6
Weather Bureau	4.6
Bexley	4.5
Moss Vale	2.9
Campbelltown	2.6
Blackheath	2.5

The low percentages from Bexley and the Weather Bureau are probably due to the late start of counts at these stations, so that the season of greatest pollen frequency was missed.

Myrtaceae.—It is difficult to estimate the importance of Myrtaceae, as the pollen has a great tendency to occur in clumps. Each clump has been treated as a single grain in the calculation of percentages; but great reliability cannot be claimed for the results. The most interesting were 17.8% at Wahroonga, where eucalypts occur in great numbers, and 0.8% at Moss Vale, where comparatively few of these trees remain. This pollen is not considered important as a cause of hay fever, but a few cases have been reported from California.

Pinus.—Only one record of a case of hay fever caused by pine pollen has been discovered (Rowe, 1939). The pollen was shed in great abundance in July and August, but the percentages for the months under consideration were not high. The high result of 27.0% from Parramatta may be due to the presence of species which shed pollen later than those in the other parts of Sydney. The pollen, which is provided with bladders, is extremely buoyant, can be carried for great distances, and will remain in the air in small amounts for several weeks.

Cyperaceae.—Cyperaceae pollen was fairly abundant; but it has been considered that its thick exine makes it harmless as a cause of pollinosis. A small proportion was recorded from all the stations, the pollen appearing continually from September to December. The only percentage which exceeded 5.0 was that from Canberra (30.1), where an extremely high count was recorded during the early part of November. The reasons for this have been mentioned in Table I.

Quercus.—Oak pollen was caught in abundance during September. Many of the stations were started too late for the oak count to be of any importance; but the following percentages are of interest:

University	14.2
Wahroonga	3.0
Parramatta	2.3
Canberra	2.0

In Canberra the maximum probably occurs in October, as owing to the colder climate the pollen is shed somewhat later than in Sydney. Although the oak sheds pollen profusely for only two or three weeks, the total amount is large, and it seems quite probable that it could cause pollinosis during this period. Almost totally disregarded in Sydney, it is considered fairly important in America.

Brachychiton.—*Brachychiton* (the Kurrajong tree) sheds pollen late in November and during early December. The pollen was caught in small amounts at all stations, the highest percentages being 10.3 from Campbelltown and 2.7 from Parramatta. No evidence is available as to whether this tree causes hay fever.

Salix.—Willow pollen was shed profusely during a short period of early spring. The pussy willow (*Salix caprea*) is often used as an ornamental tree and has occasionally been reported as a cause of hay fever. At the stations where counts were started early a small amount of this pollen was caught during September; at Moss Vale, where the pollen was shed later, a very high count (1,847, 25%) was recorded in October, and was due to the presence of pussy willows close to the station.

Oleaceae.—There is a good deal of variation in the pollen of the Oleaceae, but only one type was caught on the slides. The greater part of this was probably from privet (*Ligustrum*); but as the pollen of olive (*Olea*) is similar,

and some of these trees are planted in the university grounds, the two are considered together under the title "Oleaceæ". Small amounts of the pollen appeared at all stations with the exception of Newcastle and Blackheath, the highest percentage being 4.8 at the University. The maximum was during November, but the pollen still appeared at the end of December. Privet is considered a minor cause of hay fever.



FIGURE III.
Graph showing oak pollen season at the University station. The figures give the mean number of grains per square centimetre.

Casuarina.—The pollen of *Casuarina* was caught during August and September and then decreased in amount; the counts began to rise again towards the end of December. No consideration has been given to *Casuarina* as a possible cause of hay fever; but it sheds pollen very profusely and should be further investigated. The highest percentage was 10.6 from the Weather Bureau.

Compositæ.—The pollen of composites occurred throughout the period studied, but always in small amount. Besides many garden flowers, several common weeds belong to this family, notably the capeweed (*Cryptostemma calandulaceum*), *Erigeron*, and *Bidens*. The first is regarded as a common cause of hay fever, but it may be noted that the pollen is spiculated and shows a tendency to form clumps, and therefore is not likely to travel far.

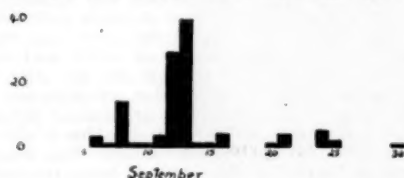


FIGURE IV.
Graph showing willow pollen season at the University station.

Taraxacum.—Dandelion pollen is easily distinguished from that of the other *Compositæ*. It occurred sporadically throughout the period studied. On November 13 a count of some thousands of *Taraxacum* and other composite pollen was recorded from Manly; this was possibly due to the disturbance by gusts of wind of a mass of these plants about 20 yards from the station. This count, however, must be regarded as abnormal, and was disregarded in the calculation of percentages. Hay fever due to *Taraxacum* pollen has occasionally been reported.

Acacia.—Many hay fever sufferers blame the wattle for their complaint; but the pollen was caught only in very small amounts, the highest percentages being 0.4 at Bexley and Moss Vale. The pollen is not at all buoyant, since it consists of groups of sixteen grains which unite to form masulæ; but it seems probable that such masses

would have a great effect when inhaled, since many people report definite symptoms from wattle.

Chenopodiales.—So far *Chenopodiales* pollen has been caught only in small amounts. The group includes two families, the *Chenopodiaceæ* and *Amarantaceæ*, which have similar pollen. The most common species in Sydney is the weed *Chenopodium album*. Most of the pollen is not shed until the autumn, so possibly a higher count will be obtained later in the season. Various members of the *Chenopodiales* have been reported as causes of hay fever in America, but have not been studied in Australia.

Proteaceæ.—A few pollen grains of *Proteaceæ* have been caught from time to time; they have not been studied as possible causes of disease. The highest percentage was 1.2 from Parramatta.

Populus.—Poplar trees shed pollen profusely in early spring. Only a small amount of pollen was noted, but as poplar pollen is very similar to that of grass, some of the early counts may have been included with those of the *Gramineæ*. Poplar trees do not occur in great numbers in the area studied. Occasional cases of poplar hay fever have been reported in America.

Ulmus.—Only a few grains of elm pollen were seen, and it may be regarded as unimportant.

Acer.—Maple pollen appeared only on slides from Moss Vale, where it was shed by a tree near the station. Maple trees shed much pollen, but are not sufficiently common in this area to be frequent causes of hay fever.

Antirrhinum.—*Antirrhinum* pollen was recorded only from Manly, where it was shed by plants in a bed near the station. It is unimportant.

Miscellaneous.—Unidentified pollens included those which were partly hidden by dust or by fragments of plant material. Only a few types of which grains were caught in any number remain unidentified; and none of these is of more than minor importance. They include one very small pollen, which was probably from *Ceratopetalum*, the Christmas bush, but which occurred in clusters, so that the features were difficult to distinguish. A few grains of the *Polygalaceæ* were noted. Unidentified pollens were probably from insect-pollinated plants in nearby gardens, or from anemophilous species which do not occur commonly. The highest percentage of "miscellaneous" pollen was 11.3 from Wahroonga, where there are many large private gardens.

Summary.

1. Previous investigations of the pollen content of the air indicate that the best method of trapping pollen is by the use of a weather vane instrument.
2. In this investigation, pollen was caught on specially prepared slides and the amount per unit area was determined.
3. Counts at eleven stations over a period of four months showed widely differing results for localities only a few miles apart.
4. Correlations between pollen counts and weather data are indicated by means of graphs; the effects of rain, sunshine and temperature are clearly seen; those of wind and humidity are less obvious.
5. The frequent occurrence of many different pollen types on the slides makes it desirable to investigate the possibility that these types may cause hay fever.
6. Numbers and percentages of different pollen types at each station are shown by a table.
7. Graphs have been prepared to show pollen seasons and the effects of weather conditions on the pollen count.

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ON THE NATURE OF ECLAMPSIA.

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ZWEIFEL, over thirty years ago, observed that there was a large excess of lactic acid in the blood in eclampsia. This work has been confirmed by over half a dozen independent authors. Bokelmann and Rother showed that in two fatal cases of eclampsia there was no glycogen in the liver (microscopic test). Stander showed that the fall in the pH of the blood in fatal cases of eclampsia might be very pronounced, falling as low as 6.9. The carbon dioxide combining power of the serum was low, being down to 30% in eclampsia, as against 44% in normal pregnancy. The alkali reserve was also low, and the urine was found to be less laevorotatory than the amount of protein present in it would lead one to expect. The urea nitrogen level in the urine was low, whereas the ammonia nitrogen level was raised.

There are, therefore, signs of acidosis in eclampsia, the specific acid that is in excess being apparently lactic acid, and probably the large excess of lactic acid accounts for the absence of glycogen in the liver, since lactic acid is an important source of liver glycogen.

It was shown by Hinwich, Koskoff and Nahum that in the decerebrate dog the main site of lactic acid formation was the muscular system, while the liver was the chief organ concerned with the removal of lactic acid from the blood. It is known that if animals are fed with sodium D-lactate by the mouth a deposition of glycogen in the liver will occur. Continuous intravenous infusion of epinephrine solution produces in the rabbit a rise in the blood lactic acid and blood sugar levels. The amounts of epinephrine that have to be injected to bring this about are extremely small and well within the limits of the amounts entering the blood normally. Hourly injections of 0.5 milligramme of epinephrine in rabbits caused the blood lactic acid level to rise from 13 milligrammes to 78 milligrammes in one hour. The blood sugar level rose from 122 milligrammes to 312 milligrammes in two hours from the first injection. Epinephrine will liberate lactic acid from muscle glycogen, and the lactic acid which spills over into the blood is apparently taken to the liver and there converted into glycogen, from which glucose is supplied to the blood as required. This constitutes the Cori cycle, which is a very important part of the general metabolism of carbohydrate. The fact that in eclampsia a large amount of lactic acid is present in the blood and there is no liver glycogen suggests that this cycle is upset in this disease. The synthesis of lactic acid to glycogen in the liver is defective.

Goldblatt described the deposition of glycogen in the livers of young rabbits under the influence of insulin, but found two rabbits suffering from suppurative conjunctivitis

in which this deposition of glycogen did not occur; he suggested that this was due to the infection.

Corkill showed that mild diphtheritic toxæmia likewise prevented the deposition of glycogen in the livers of young rabbits under the influence of insulin. There is good evidence to show that the action of insulin in causing a deposition of glycogen in the liver of young rabbits is an indirect effect depending upon the fact that the hypoglycæmia induced by the insulin calls out epinephrine, the effect of which is to cause the transfer of glycogen from the muscles to the liver by converting the muscle glycogen into lactic acid, which in this form is transported in the blood.

In eclampsia we have to deal with a derangement of the Cori cycle produced by infection or toxæmia, so that lactic acid is not promptly and efficiently converted into glycogen. It accumulates in the body and gives the coma of acidosis. The condition is aggravated by the excess of lactic acid produced in the convulsions to which many of the changes in the liver, kidneys and other organs are probably largely due.

The fact that the urine has been found less levorotatory than the amount of protein present in it would lead one to expect is probably due to the *D*-lactic acid it contains, for that is the sort of lactic acid produced from muscle, and it is the variety the healthy liver can most effectively synthesize to glycogen.

Separate tests have been made in respect of the capacity of the liver to turn different types of lactic acid into glycogen; *D*-lactic acid was most easily converted by the liver.

These facts suggest very strongly what might be called the bacterio-metabolic theory of eclampsia. Apparently infection or toxæmia can disrupt the function of the Cori cycle so that the liver can no longer effectively synthesize lactic acid into glycogen. This causes a rise of the lactic acid level in the blood, and coma. Convulsions follow, in which immensely greater quantities of lactic acid must be produced by muscle activity; these cannot be dealt with by a liver unable effectively to remove the sarcolactic acid from the blood. This theory offers a reasonable explanation of many interesting points. For example, multiple pregnancies are much more frequently associated with eclampsia than single pregnancies. Since lactic acid in the blood of the fetus is in much higher concentration than in that of the mother, we can understand why an increase in the number of infants should increase the amount of lactic acid and coma. All are agreed that *primiparae* are much more prone to eclampsia than *multiparae*. This is to be expected for two reasons. The first labour is very much longer than subsequent labours, and the muscular effort required in delivery is much greater. This would be quite sufficient of itself to account for the greater frequency of intrapartum eclampsia in *primiparae*. In addition, presumably, a woman would be subjected to greater strain and anxiety in looking forward to a first baby than in looking forward to any subsequent child. This would occasion an excessive secretion of epinephrine and would likewise increase the quantity of lactic acid in the blood; but for these factors to work there must be an infection or a slight toxæmia to interfere with the glycogen-synthesizing power of the liver.

It is generally agreed that eclampsia is more frequent in winter and in cold damp weather, and that changes of weather favour its occurrence. This is almost certainly due to the fact that the same conditions favour infections and toxæmic states which would bring about in the liver the initial disturbance that is postulated.

During the last war the incidence of eclampsia was greatly reduced. I do not consider that the dietetic explanations that have been offered are valid. It may be that marital relations favour slight infections and that the absence of the husbands at the front may have accounted for the reduction in the incidence of eclampsia.

The disease is more frequent in city than in country practice, and this is not inconsistent with my hypothesis.

It is held by some authors that a certain immunity to eclampsia occurs; but this is probably difficult to prove.

If it is admitted that one case of eclampsia occurs in about 500 labours, while of those subjects who have suffered from eclampsia and become pregnant again approximately one in fifty has a second attack of eclampsia, it does not seem justifiable to speak of these figures as suggesting any immunity, since the one in fifty is calculated on persons all of whom have had former attacks of eclampsia. Moreover, when the incidence was one in one in the case of the first labour, this fall to one in fifty might suggest an immunity or it might suggest a recovery from some infection, and in the light of my present theory I believe it cannot be safely interpreted.

There are those who believe that there is a constitutional element in the causation of eclampsia; but the descriptions of types of patients who are alleged to be more susceptible than others are extremely unconvincing.

If for the time being this bacterio-metabolic theory of the causation of eclampsia is accepted, what should be the mode of attack on the disease? This divides itself naturally into two headings: (i) preventive treatment and (ii) treatment of the disease.

Preventive Treatment.

1. Isolate the patient for some days before her confinement. Do not allow her to come into contact with the general public, who may have colds or other infections, and be particular in examining her to ascertain that she herself has no infection likely to upset her.

2. Ascertain the presence of any heart disease with defective compensation or other cause of defective oxygen supply to the tissues, for the synthesis of lactic acid to glycogen is an aerobic function.

3. Ascertain any tendency to emotional disturbance, and try to prevent it.

4. Ascertain in advance the presence of multiple pregnancy, and if possible test the power of the patient to get rid of excess lactic acid in the blood by measuring it before and after a definite amount of muscular exertion or before and after the administration of a definite amount of sodium lactate.

5. Classify the patients according to their capacity to get rid of lactic acid from the blood, and ascertain any indication of those about to develop eclampsia.

Treatment of Declared Disease.

The ability of sarcolactic acid to produce the clinical picture of eclampsia is readily demonstrated in rabbits. If small quantities are injected intravenously every five minutes the rabbit will become comatose and have convulsions. Hitherto eclampsia has been treated by sedation (Russian method) or by the promotion of elimination. I consider that the proper way to treat it is to make good the defect of alkali reserve which occurs in the disease and which we can estimate readily by Van Slyke's method. The defect of alkali reserve which is found, taken in consideration with the total blood volume, will give the amount of alkali to inject into the blood stream. In no case must an excess of alkali be injected; otherwise the patient will pass from the convulsions of eclampsia to the convulsions of alkalosis, with disastrous results. The injection of alkali cannot be too carefully undertaken, for the sarcolactic acid enters the tissues and time is required for it to be neutralized.

The effort at elimination which has been so advocated by the Dublin school has allowed the occurrence of serious albuminuria. The replacement of the alkali defect in the blood by a calculated quantity of alkali will prevent this occurrence.

The sedation method employed by the Russians cannot cut off the entire supply of sarcolactic acid, much as it has been praised by Stroganoff.

Conclusion.

To conclude, eclampsia is, in my opinion, an acute sarcolactic acid intoxication occasioned by a large production of the substance within the body and by an interruption of its disposal by the synthesis of glycogen, which depends upon the presence of some infection.

THE USE OF SULPHONAMIDE COMPOUNDS IN FILARIAL COMPLICATIONS.

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FEBRILE reactions in filariasis have been variously attributed to allergic reactions (Manson-Bahr, 1937) or to secondary streptococcal invaders (Anderson, 1924). In elephantiasis of filarial origin, secondary streptococcal infection is, according to Buttle (1939), responsible for pain, swelling and pyrexia.

In complications of filarial elephantiasis, Floch (1936), Berny and Gippert (1937), Advier (1937) and Chabeuf (1938) have reported rapid subsidence of pain, high temperature and swelling followed by apparent cure of the condition with no recurrences with the use of sulphanilamide derivatives in quite small doses (1.5 grammes daily for six days). The sulphanilamide derivatives in this instance were "Prontosil rubrum" (4-sulphonamido 2, 4-diamino-azo-benzol hydrochloride) or "Proseptasine" (p-benzylamino-benzenesulphonamide).

With these results in mind, I tested the effects of "M & B 693" (2-sulphanilyl-aminopyridine) in a series of cases of filariasis due to *Wuchereria bancrofti*, occurring in Nauruans, in which various complications were present. Whatever the actual cause of these complications was, microfilariae were present in the blood films throughout the attack; it thus differed from the lymphangitis, accompanied by fever, headache, vomiting and rigors described by Manson-Bahr (1937), in which the microfilariae usually disappear from the peripheral blood within twenty-four hours of the attack.

The complications will now be described under their respective headings, together with illustrative case histories.

Lymphadenitis and Lymphangitis.

CASE I.—K., a male Nauruan, aged twenty-four years, was a hospital caretaker. He was first examined on November 2, 1940, when he complained of fever and of pain and swelling in the left groin. He gave a past history of previous similar attacks.

Examination revealed a healthy native with no abnormalities in the cardio-vascular, pulmonary, alimentary or central nervous system. The left inguinal lymphatic glands (superficial group) were enlarged and tender. Microfilariae were found in the blood at night.

"M & B 693" was given, the first dose being administered at 10 a.m. on November 2, 1940. The tablets were given every four hours in the following quantities: two doses of two grammes and nine doses of one gramme. The effect of the treatment on the temperature was very similar to that illustrated in Figure I (Case II). The pain and tenderness disappeared within forty-eight hours and the patient made an uninterrupted recovery.

Subsequently the patient had an identical attack, during which microfilariae were present in the blood stream. Similar effects followed the use of "M & B 693". This indicated that although the drug has a valuable effect on the complication (which may be due to secondary infection), it has no permanent curative effect on the filarial condition.

CASE II.—Chief D., a male Nauruan, aged sixty years, was a district chief. He was first examined on November 18, 1940, when he complained of fever and pain in the left loin radiating to the umbilicus and to the left Poupard's ligament. In nature this pain closely resembled that associated with renal colic. Apart from the symptoms complained of, no other abnormalities were found. Urinary examination revealed an acid urine containing a faint trace of albumin, no sugar, blood or pus, few red blood cells, and very few epithelial cells. Microfilariae were found in the nocturnal blood film. Radiological examination, both with and without "Uroselectan", revealed no urinary calculus; but opacities in the left lumbar region suggested enlarged lymph glands. The case agreed in many respects with one described by Cilento (1940).

"M & B 693" was given from 8 p.m. on November 19, 1940. The dosage was two of two grammes followed by nine doses of one gramme, the drug being given at intervals of four hours. The effect on the temperature is

shown in the chart (Figure I). A similar dosage of "M & B 693" was given on November 21, 1940, when she complained of pain and swelling in the right groin. She gave a history of similar previous attacks. Examination revealed a healthy girl with no lesions in the alimentary, cardio-vascular, pulmonary or central nervous system. The right superficial inguinal lymphatics were enlarged and tender, and tenderness and swelling extended to the right labium major, suggesting involvement of the lymphatics of the round ligament of the uterus. Microfilariae were found in the nocturnal blood film.

From 10 a.m. on November 21, 1940, the patient was given "M & B 693" at intervals of four hours, the dosage being two grammes for the first four doses and one gramme for the subsequent seven. The effect of the drug was similar to that illustrated in Figure I (Case II). A second course of "M & B 693" was begun on November 23; this consisted of two doses of two grammes followed by nine doses of one gramme. The patient made an uninterrupted recovery.

From 10 a.m. on November 21, 1940, the patient was given "M & B 693" at intervals of four hours, the dosage being two grammes for the first four doses and one gramme for the subsequent seven. The effect of the drug was similar to that illustrated in Figure I (Case II). A second course of "M & B 693" was begun on November 23; this consisted of two doses of two grammes followed by nine doses of one gramme. The patient made an uninterrupted recovery.

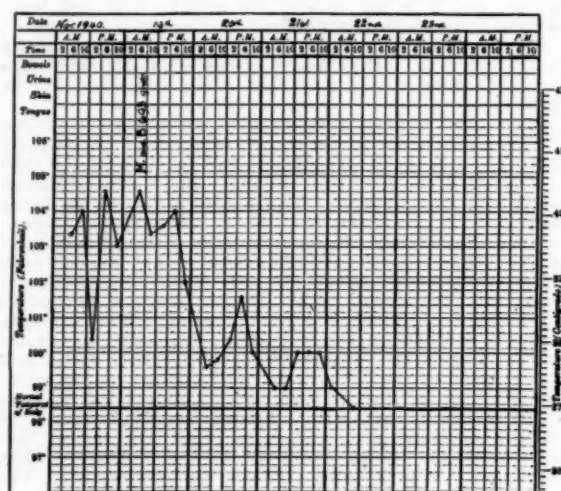


CHART I (Case II).

Funiculitis with Scrotal Cellulitis.

CASE IV.—R., a male Nauruan, aged thirty-two years, was first examined on September 30, 1940, when he complained of pain and swelling in the scrotum. He had previously (some weeks before) had a radical operation for the cure of right-sided filarial hydrocele.

Examination revealed a well-developed native with no lesions in the alimentary, pulmonary, cardio-vascular or central nervous system. The whole scrotum, but particularly the right side, was swollen, red and tender. The right spermatic cord was also enlarged and extremely tender. Microfilariae were present in the nocturnal blood film.

On September 30, at 10.30 a.m., a course of "M & B 693" was begun. This consisted of eleven doses, given at intervals of four hours, the first two of two grammes and the remainder of one gramme.

On October 1 the patient reported relief from pain and the swelling had diminished in size. The course of "M & B 693" was repeated on October 2 and the patient made an uninterrupted recovery.

In this case the pyrexia was not immediately influenced; the temperature chart bears a close resemblance to that shown in Figure II (Case VII).

Mastitis.

CASE V.—E. was a female Nauruan, aged fifty-two years. She was first examined on November 7, 1940, when she complained of pain and swelling in the right breast. She gave

a history of many previous attacks in the same breast, and stated that on one occasion the breast had been incised during an attack, without relief or cure.

On examination the right breast was found to be enlarged, reddened and tender. The nipple was enlarged and hard. Part of the skin overlying the breast was tense and had a *peau d'orange* appearance. Palpation, which was painful, revealed a mass in the breast substance, in what would be the external upper quadrant if allowance was made for the pendulous nature of the breast. One enlarged tender lymphatic gland was palpated just under the lateral edge of the *pectoralis major*; but no enlargement of the axillary lymphatic glands was present. A pigmented keloidized scar lying over the upper and outer quadrant marked the site of the incision described in the patient's history. The left breast was normal. Microfilariae were found in the blood at night.

In view of the past history of similar febrile attacks, it was decided that the tumour was of filarial origin; but as a matter of interest it was investigated radiologically. Mammographs were taken of the breast, which had previously been injected with Ipiodol. For this the technique described by Hicken (1937) was employed. Details of the findings will be published in a subsequent paper.

Morphine was necessary to control pain. On November 7, 1940, at 10 a.m., a course of "M & B 693" was begun. This consisted of two doses of two grammes followed by eleven doses of one gramme, the doses being given every four hours. The effect of the drug was to produce a prompt fall in temperature. At the same time the pain, swelling and redness diminished and the patient was discharged from hospital on November 21. A final examination revealed a slight diminution in the size of the mass in the breast and a return to normal size of the retropectoral lymph gland.

the extensor tendons of the wrist; this was swollen, but contained no pus. Courses of "M & B 693", similar to that described above, were given on November 21, 23 and 25. The patient made an uninterrupted recovery and no relapses have been reported to date.

Myositis.

CASE VII.—B., a male Nauruan, aged twenty-one years, was first seen on November 25, 1940, when he complained of pain and swelling in the right calf. Examination revealed that the calf muscles were of an almost wooden hardness and were extremely tender on palpation. Microfilariae were present in the blood.

On November 25, at 10 a.m., a course of treatment with "M & B 693" was begun. It consisted of two doses of two grammes and nine doses of one gramme, taken at intervals of four hours. Similar courses of "M & B 693" were given on November 27 and 29 and on December 4. The effect on the temperature is seen in the chart (Figure II); it will be observed that no dramatic fall in temperature occurred. The pain, tenderness and swelling did not show any immediate response, and it is doubtful whether in this case "M & B 693" had any therapeutic value.

Filarial Abscess.

CASE VIII.—E., a female Nauruan, aged thirty-five years, was first seen on October 15, 1940, when she complained of pain and swelling of the left thigh of four days' duration. Examination revealed a large mass overlying Scarpa's triangle. This was hot, reddened and painful to light touch. The overlying skin was extensively desquamating. Fluctuation was obtained, and it was obvious that pus was present at many points. Microfilariae were found in the blood.

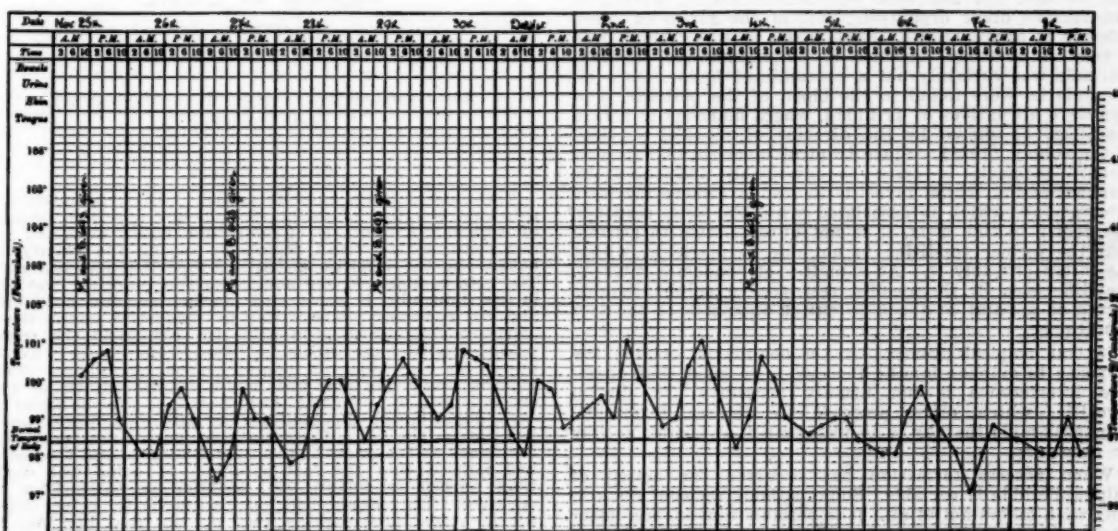


CHART II (Case VII).

Teno-Synovitis.

CASE VI.—T., aged about sixty years, a male Nauruan, was first examined on October 18, 1940, when he complained of pain and swelling in the left forearm, with pain and difficulty in flexing and extending the fingers and in flexing and extending the wrist. He gave a history of many similar attacks; during one of these the forearm had been incised without relief or cure of the condition. Examination revealed that the whole limb was swollen below the level of the elbow, pronounced redness and tenderness were present at the dorsum of the lower third of the forearm, over the tendon sheath of the *extensor digitorum sublimis*. No abnormalities were found on radiological examination. Microfilariae were present in the blood.

Treatment with "M & B 693" was begun on November 18, the dosage being two of two grammes and eleven of one gramme. The temperature, which had been 100° F., fell to normal and remained at that level; but there was no instantaneous relief of pain, swelling and redness. On November 20 an incision was made down to the sheath of

On October 15, at 10 a.m., a course of "M & B 693" was begun; it consisted of two doses of two grammes and nine doses of one gramme. This was repeated on October 17. On October 19 the skin had broken down at one point, releasing foul greenish-black pus. Operation was performed and the pus cavities, which intercommunicated extensively under the skin and in the subcutaneous tissue and fat, were freely opened up. "M & B 693" was again given on this date, in the same dosage as before. The administration of "M & B 693" was again repeated on October 24; but since the drug nauseated the patient, and, moreover, appeared to exert no curative effect on the condition, it was not repeated. The patient made very slow but definite progress towards recovery; but healing was not finally completed until December 16.

CASE IX.—D., a male Nauruan, aged about forty years, was first examined on October 28, 1940, when he complained of fever, pain and swelling of the right buttock, of two days' duration. The right buttock was swollen, discoloured and fluctuant. Microfilariae were present in the blood.

The abscess was opened and drained on October 28, and on the same day, commencing at 3 p.m., a course of "M & B 693", of dosage similar to those described above, was given. A rapid fall in the temperature and pulse rate occurred. Only one course of "M & B 693" was found to be necessary, and the patient made an uninterrupted recovery.

Discussion.

In the comparatively simple (and common) complication of lymphangitis and lymphadenitis "M & B 693" exerts a very valuable effect; this may possibly indicate that the complication is due to secondary streptococcal invasion. This view is supported by the fact that microfilariae are present in the blood stream throughout the course of treatment and are not diminished in number by the action of the drug.

That "M & B 693" has no prophylactic action on this type of complication is shown by the fact that it may recur after cessation of the course.

In the complications funiculitis, mastitis and tenosynovitis, "M & B 693" has a similar curative effect; but again it is doubtful whether any prophylactic effect is possessed by the drug, although there were no recurrences of these complications during the patients' stay in hospital.

With the complication of myositis the action of the drug is uncertain, quite unlike the usually satisfactory results obtained with this compound in tropical pyomyositis (Earle, 1939). In this connexion Wilcocks (1940), reviewing the action of sulphanilamide in tropical pyomyositis, points out the conflicting theories regarding the causation of this disease. It has been ascribed to filaria, leptospira and various other organisms; but in the series of cases referred to above (Earle, 1939), in all of which there was a very satisfactory response to sulphanilamide therapy, filariasis was certainly not a concomitant factor, since no microfilariae were found in the blood of the patients, who also were all natives of Trinidad, where filariasis is a rare condition, as shown by the director of medical services of the colony (1938). Since tropical myositis in Trinidad (where filariasis is rare) is favourably influenced by sulphanilamide, whilst myositis in Nauru (where filariasis is common), which is associated with filariasis, responds but poorly to this drug, it is not unreasonable to assume that the former condition is not due to filariasis, whilst the latter probably is. As a matter of academic interest, the difference in therapeutic response to sulphanilamide serves as a point in the differential diagnosis of the two conditions.

In true tropical pyomyositis (of non-filarial origin) the response to sulphanilamide therapy is so good that operative interference is not usually necessary; in filarial myositis, which often proceeds to abscess formation, sulphanilamide therapy is so uncertain that operation may be necessary.

When abscess formation has occurred the action of sulphanilamide is variable. Some patients respond remarkably well, others not at all. It is possible that in this latter group the organisms responsible for the retardation of healing are saprophytes or "rough" organisms, which, as shown by McIntosh and Whitby (1939), are uninfluenced by drugs of the sulphonamide group.

Summary.

1. A series of cases of filarial complications, occurring in native Nauruans, is described.
2. The effect of "M & B 693" on these conditions is discussed.

Acknowledgement.

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Reports of Cases.

A DIFFICULT DIAGNOSIS.

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Clinical Record.

A FEMALE patient, aged forty-eight years, complained of pain and vomiting of twenty-four hours' duration, preceded by a feeling of faintness of forty-eight hours' duration. She had continued to vomit repeatedly during the twenty-four hours, and the vomitus looked like food that she had eaten. The pain commenced one hour after the vomiting, low down in the right loin; it was a dull, continuous ache, not colicky and not radiating. There was no epigastric pain. Severe diarrhoea commenced soon after the pain, and the patient passed twelve loose stools in twenty-four hours. To her knowledge they did not contain blood or mucus. Three months previously she had had a similar attack of pain, accompanied by vomiting and diarrhoea, which lasted for three days; but on this occasion the pain was situated on the left side. The only disturbance of micturition was slight frequency at the onset of this second attack, and the patient had noticed that the last specimen of urine was darker than normal in colour. No scalding on micturition had occurred. The patient had lost two stone in weight during the previous three months, and she felt that her face had taken on a drawn appearance; apart from this she had not been ill between the attacks. The menstrual periods had ceased fifteen months previously. The patient attributed the attack under discussion to some chops which she had eaten, and the previous attack to some rabbit. For three months her appetite had been poor; but she still enjoyed a varied diet, including meat. Shortly before her admission to hospital she had had a shivering attack lasting for half an hour; but there had been no undue sweating. She had no cough or sputum. On the day of her admission to hospital she felt giddy, but she had no headache.

Examination revealed a middle-aged, flushed woman lying quietly in bed; she was not in obvious pain, but she looked ill. She appeared well nourished; her skin was elastic and not wrinkled. The pupils were moderately dilated and reacted to light and accommodation. The sclera were not jaundiced. The tongue was clean and the breath was heavy but not abdominal; the patient was edentulous. Small patches of white exudate were present on the right tonsil. The pulse was rapid and of good volume; the radial arteries were not thickened. The blood pressure was 135 millimetres of mercury systolic and 80 diastolic. The temperature was 101.4° F. The pulse rate was 132 per minute and the respirations numbered 29 per minute. The urine was amber in colour and acid, and its specific gravity was 1.020; it

contained no albumin, acetone or sugar. Clinical examination revealed no enlargement of the heart. The cardiac impulse was forcible and the whole of the precordium pulsed with each heart beat. The heart sounds were very loud, and a loud systolic murmur could be heard all over the precordium. The only abnormality detected in the lungs was at the base of the right lung posteriorly, where a diminished vesicular murmur and diminished vocal resonance were noted. The percussion note was normal and there were no adventitious. Movement of the abdomen was somewhat less on the right than on the left; there was no rigidity. The abdomen was tender all over, the point of maximum tenderness being just above and behind the right anterior superior iliac spine. The next most tender point was in the left iliac fossa. Deep pressure over McBurney's point revealed no particular tenderness, and no tenderness was elicited in the costophrenic angles. The liver was not palpable, and liver dullness was not decreased. No areas of dullness were detected in the loins. A vague resistance to deep pressure was felt over the point of maximum tenderness; otherwise no mass was detected in the abdomen. Rovsing's sign was not elicited. The skin was flushed, but there was no rash. When a finger was inserted into the rectum tenderness was elicited; it was greater high up on the right side than on the left. When a finger was inserted into the vagina, pressure in the right fornix elicited acute tenderness; only slight tenderness was elicited by pressure in the left fornix. The psos sign was not elicited, and the deep reflexes were equal and active. Microscopic examination of a specimen of urine revealed an occasional pus cell but no organisms. An examination of the blood revealed that the leucocytes numbered 17,300 per cubic millimetre.

Such was the evidence on which a diagnosis had to be made. A confident decision could not be reached; but it was considered wise to open the abdomen by a right paramedian incision. At operation a diagnosis of acute appendicitis was made. The caecum was high up and the appendix lay in the paracolic gutter, pointing upwards. It was large, red and oedematous, and when it was opened free pus was obtained. There was no free fluid in the peritoneum.

The patient had a stormy time for two days, with crepitations at the bases of both lungs, but no definite consolidation. The temperature gradually subsided during the next ten days and she was discharged from hospital, well, on the seventeenth day.

Discussion.

In this case the following points strike me as being of interest:

1. An operative diagnosis of acute appendicitis was made in the absence of practically every classical sign and symptom of this disease.
2. Appendicitis was associated with diarrhoea and a high temperature. Both these accompaniments are mentioned in Bailey and Love's "Surgery"; but they must be very seldom seen in combination.
3. A pelvic examination is of great value in any doubtful case, and in this instance it furnished the only definite sign of an acute lesion in the abdomen, and the pelvic tenderness on the right side was the one factor on which the decision to operate was based.
4. A leucocyte count may be of value in the diagnosis of appendicitis; in this case it ruled out food poisoning and gastro-enteritis.
5. The occurrence in appendicitis of a raised respiratory rate and abnormal signs at the base of the right lung is interesting; the cause was probably that the right leaf of the diaphragm was fixed, as the appendix was situated high up.

HIRSCHSPRUNG'S DISEASE EXTENDING TO THE ANAL CANAL.

By J. G. MCGILASHAN,
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Adelaide.

THE following case seems worthy of interest in that it belongs to the uncommon type of Hirschsprung's disease in which the involvement has spread to the rectum.

Clinical Record.

The patient, E.J., aged eighty-five years, a widow, with three children, was admitted to the Royal Adelaide Hospital under the care of Dr. I. B. Jose, honorary surgeon, on

February 11, 1941. She was in a stuporose condition on her admission, and gave a rather sketchy history, the main points of which were that she had vomited at frequent intervals for several days and had had "pains in the stomach". No further history was obtained before the death of the patient, which occurred six hours later.

Examination revealed a pulse rate of 60 per minute, a temperature of 96° F., and a respiration rate of 18 per minute. The abdomen was swollen and tight and tympanitic to percussion. No visible peristalsis was observed, nor was any local mass palpable. The tongue was brown and furred but moist. Two hæmorrhoids were present.

Autopsy.

A post-mortem examination (number 25/41) was performed on February 12. A mid-line incision disclosed an almost complete absence of omental and mesenteric fat. The large gut from the anal canal up to and including the caecum was very distended and thickened. Both transverse colon and rectum measured three and a half inches in diameter. The enlargement was uniform. The small intestines were normal. The diaphragm was raised to the level of the third rib in the right mid-clavicular line. The gall-bladder was packed with yellow faceted stones, but was not enlarged. Incision of the large gut disclosed multiple hæmorrhages extending into the mucosa of the transverse and sigmoid portions. Ulceration was absent throughout the whole of the large gut. The most striking feature was the great hypertrophy of the wall. Two large external hæmorrhoids projected from the anus. The rectum was filled with offensive fluid faeces. The lowermost inch and a half of the rectum was not dilated, but constituted a firm anal canal. Next one saw a ring, which was not very firm in consistency and in which several taggy polypoid projections were noted. By contrast the rectum immediately above this ring was dilated and hypertrophied and showed several hæmorrhagic splashes. There was no dilatation of the urinary tract. Examination of the lower end of the œsophagus revealed deeply congested mucosa.

Permission was not granted to examine the brain. A section was taken from the anus, and microscopic examination of this material revealed great thickening of the stratified epithelium at the junction of the canal with the skin of the anus. The epithelium of the anal canal was atrophied and was represented by a thin hyaline layer. In the submucosa intense round-cell infiltration was present, the majority of the cells being lymphocytes. There was also an apparent increase of fibrous tissue immediately internal to the muscularis. The muscular layer of cells showed great thickening. Organization and canalization of the thrombosed hæmorrhoids had taken place. A section of kidney was examined microscopically and some degree of cloudy swelling of the tubules was found, as well as hyalinization of a few of the glomeruli and atrophic changes in the blood vessels.

Discussion.

It is unfortunate that no information can be obtained regarding the early history of this patient. The clinical notes state that she had apparently enjoyed good health all her life, but the reliability of this statement is questionable, as the patient was very stuporose on her admission to hospital and her mental condition did not improve before her death.

Apart from the large intestine, nothing indicative of severe disease was apparent from the macroscopic findings at autopsy. It seems unlikely that the numerous gall-stones could in any way have led to the death of the patient. The cause of death seems clearly traceable to the large intestine. That the condition was one of long standing is indicated by the presence of both dilatation and hypertrophy. H. A. Walton, writing in *The Lancet* (Volume II, 1930, page 1231), suggests that dilatation of the colon is due to an "idiosyncrasy", usually congenital. He divides the cases into two types: first, those occurring in young people (usually in males), and secondly, those first appearing in people over the age of fifty years. Without any previous history it is difficult in this case to be sure to which of the two types the patient belongs. But naturally one inclines to the second type. Hurst and Walton agree that the precipitating cause of Hirschsprung's disease is a neuro-muscular incoordination, an achalasia. According to Barrington-Ward this is attributed to over-activation of the sympathetic innervation of the colon and rectum. This would allow of the presence of both hypertrophy and dilatation. If one assumes that death in these cases is due to toxic absorption of undischarged faecal matter in the large bowel, possibly with infection superadded, one would anticipate signs of toxæmia in other organs. These signs, although not pronounced, were present in the form of cloudy swelling. The clinical history of "pains in the stomach" and vomiting, with the

added signs of the swollen abdomen and raised diaphragm (presumably due to pressure from below by the dilated large intestine) is consistent with the findings in the cases discussed by Hurst and Walton. Death seems to have been due to toxic absorption following retention of faecal matter by a greatly emaciated patient. The chief interest of the case consists in its being an example of the uncommon type of Hirschsprung's disease in which the dilatation and hypertrophy involve the whole of the rectum above the anal canal as well as the colon and caecum. In such a case the achalasia is obviously situated in the anal canal.

Summary.

A case is described of much hypertrophy and dilatation of the caecum, colon and rectum, attributed to achalasia of the musculature of the anal canal.

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I should like to express my gratitude to Dr. I. B. Jose, honorary surgeon, Royal Adelaide Hospital, and to Professor J. B. Cleland, professor of pathology, Royal Adelaide Hospital, for their permission to publish this article.

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Reviews.

AN X-RAY ATLAS OF SILICOSIS.

A work entitled "An X-Ray Atlas of Silicosis", by Dr. Arthur J. Amor, has been received.¹ This work fills a long-felt want and sums up concisely the present-day knowledge of silicosis and should be most useful, as at present the subject is scattered through various medical and industrial publications and is difficult of access. The contents are arranged well and deal with the aetiology, pathology, the radiological examination, clinical findings and prognosis. The last portion of the book contains a valuable series of illustrative cases. The author lays it down that the only substances which produce the typical changes in the lungs are silica and various silicates contained in asbestos. It is stressed that the term anthracosis is an anachronism, since coal dust (that is, carbon) has not the fibrosis-producing power of free silica. The term is used in two senses: first, to describe the blackening produced by coal dust and also to describe the silicosis which occurs in underground coal-miners who are exposed to mixed dust. Siderosis also is a term used to describe the silicosis occurring in haematite workers when once again the destructive agent is the free silica. In regard to silicates, the author points out that there must be some specific action of the particular compound, as although chrysotile asbestos and French chalk are of similar composition, no lung fibrosis is produced by the inhalation of the latter substance. Two main points must be considered in studying chest diseases, namely, (a) concentration of the dust cloud and (b) the size and distribution of the particles. It is necessary for a certain stage of dust concentration to be present before changes in the lungs are produced; unless this stage is reached man may work in even harmful dusts. Unfortunately it is not possible to estimate scientifically the "safe" concentration of dust, and all dust counts and estimates are only approximate. The size of particles generally accepted as dangerous range up to 10 microns for silica and up to 200 for asbestos. Such particles are invisible to the naked eye, and a room which shows little dust to the naked eye may contain a dangerous collection of harmful particles. Once again it is stressed

¹ "An X-Ray Atlas of Silicosis", by A. J. Amor, M.D., M.Sc., with a translation into French by R. J. Horne, M.A., and a foreword by Sir Wilson Jameson, M.A., M.D., F.R.C.P.; 1941. Bristol: John Wright and Sons Limited. Crown 4to, pp. 218, with illustrations. Price: 39s. net.

that the higher the silica content, the greater the hazard. The author reminds readers that a superadded tuberculosis increases greatly the gravity of the condition of silicosis and that it is rarely possible to demonstrate the tubercle bacilli in the sputum. A concise description of the method of action of silica in the tissues is given, and it is laid down that the main change is occasioned by the fibrosis-producing property of the silica when it passes into colloidal solution rather than by the irritation caused by the free silica particle. The lung changes are modified somewhat by the presence of incidental dusts. Superadded tuberculosis rarely gives the typical appearances of uncomplicated tuberculosis, and even in the presence of cavitation it is extremely difficult to tell, even at post-mortem examination, whether the cavitation is due to tuberculosis or to a breaking down of a silicotic consolidation.

The chapter on the radiological examination and appearances follows conventional lines and needs no special comment. The clinical manifestations of silicosis are set out well, and it is pointed out that dyspnoea is the most important early symptom; this is slowly progressive, and it is of interest to note that the dyspnoea is more marked when the man is doing ordinary walking than when he is actually working. The fibrous replacement of normal lung tissue combined with thickening of the pleura and adhesions is followed by emphysema and toxic cardiac changes. The clinician finds it extremely difficult to make a diagnosis and it is almost entirely dependent on the radiological examination. In the chapter on prognosis there is an interesting table showing the average age at death, together with the average duration of employment. This table is rather startling in relation to the industry of sandblasting and to the manufacture of scouring powders, in which the duration of employment was proved to be from six to nine years only.

The remainder of the work is comprised of a series of excellent plates with the history of dust exposure, medical history, clinical findings, radiological appearances and post-mortem results. The reproduction of films is far ahead of any previously published.

In conclusion, the work is by far the most important yet published and it should be of the greatest value to all interested in this class of industrial disease.

VITAMINS IN TREATMENT.

In their book "Vitamin Therapy in General Practice"¹ E. S. Gordon and E. L. Severinghaus give an excellent résumé of the position of vitamins, dietetics and nutrition today, and endeavour to bring the work of the research laboratory and clinical practice closer together and to cover the wide gap which has resulted from the rapid advances in this field of medicine.

The authors have approached the subject of vitamins in a plain, straightforward manner, considering the various vitamins in order, and they have included sufficient information as to the chemical composition and biochemical reactions to assist the general practitioner to understand the composition of the principal synthetic preparations. Adequate tables of the vitamin content of many foods are given, and chapters are devoted to the values of carbohydrates, proteins, fats and minerals, as well as to considerations of the economic aspects of various diets.

There is considerable information to assist in a more active diagnosis of vitamin deficiency diseases. The book appears unique in so far as it has attempted to correlate the huge mass of scattered information of this important subject, and the need for such a book is more vital because the biological chemist has advanced so rapidly that the clinician has not had sufficient time or opportunity to apply or keep pace with the more recent discoveries. Apart from the purely scientific advances, the work pointedly shows the importance of vitamins on the nutritional status of the citizens of a nation and the need for science to compensate for many of the deficiencies which result from our civilized dietetics.

The book can earnestly be recommended to every general practitioner as a foundation for essential knowledge on present and post-war nutrition in the campaign for national fitness in this field.

¹ "Vitamin Therapy in General Practice", by E. S. Gordon, M.D., M.A., and E. L. Severinghaus, M.D., F.A.C.P.; 1940. Chicago: The Year Book Publishers Incorporated. Large crown 8vo, pp. 258, with illustrations. Price: \$2.75 net.

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ULTRA-VIOLET IRRADIATION.

It has been truly said that one of the hardest tasks a clinician may set himself is to make a correct statement on the value of ultra-violet irradiation. The difficulty may be traced to several causes. The first is that the band of wave lengths of electromagnetic vibrations that have healing power when applied to the human body has not been accurately determined. Again, ultra-violet rays are known to produce effects on the body tissues; some of these are understood, some are not. In some pathological conditions ultra-violet rays are known to produce beneficial results; in others the benefit conferred is doubtful. Lastly, the fact that the clinician who uses ultra-violet irradiation in the treatment of his patient is actually doing something has a psychological effect on the patient, and it is easy to say that the rays themselves have done good when this may be quite untrue. It is this fact and the ease with which ultra-violet rays may be used that make it difficult for the clinician to be a cold and discriminating critic. Since it is so difficult for the careful clinician to know when the method can be used in sure and certain hope that results will follow, and since it is so easy for the earnest clinician to deceive himself, it will be useful to inquire into what is known in medical literature as the present "status" of ultra-violet therapy. In the course of this discussion we propose to show by reference to one or two recent contributions to the literature that although certain important facts have been ascertained and certain indications for the use of ultra-violet irradiation have been accepted, there is still much difference of opinion in regard to the effect of ultra-violet rays on the tissues and that for this reason knowledge of their therapeutic application is by no means complete.

Perhaps it will be well to remember that if electromagnetic vibrations are charted in relation to the visible

rays of the spectrum, the very short γ rays will be found at one end and then will come in turn X rays, ultra-violet rays, the visible rays of the spectrum, the infra-red rays, the short Hertzian rays and the Hertzian waves used in wireless transmission. The range of wave lengths is so large that different units of measurement are used for the different types of rays. Ultra-violet rays are measured by the Angström unit, which is one ten-millionth of a millimetre, and the wave length of ultra-violet rays ranges from approximately 1,800 to 3,900 Angström units. When radiant energy reaches the body no effect is produced unless the energy is absorbed. Sir Robert Stanton Woods emphasized this in a discussion on ultra-violet irradiation in "The Medical Annual" of 1938. He also pointed out that, generally speaking, the penetrating capacity of any form of radiant energy is directly proportional to its wave length. Therefore, for absorption by an atom to occur, and consequently for the production of atomic change, wave length must be extremely small. Difference of effect depending on wave length may therefore be expected within the band comprising the ultra-violet rays. This is the commonly accepted view, and it is therefore appropriate to recall the classification of ultra-violet rays according to their absorption in the different layers of the skin. This classification was mentioned in this journal in June last year by E. P. Dark. Dark stated that rays with a length of 1,849 to 2,900 Angström units are absorbed in the superficial layers of the epidermis and are abiotic in action. Rays from 2,900 to 3,300 Angström units are absorbed in the deep layers of the epidermis and cause pigmentation. Rays ranging from the 3,300 to the 3,900 unit mark are absorbed by the blood of the capillary loops in the dermis. N. E. Titus, in the discussion on a paper read by F. H. Krusen at the annual session of the American Congress of Physical Therapy last September,¹ said that it was reasonable to believe that there was no specificity in wave length—that longer wave lengths only required proportionately more time to accomplish the same result as shorter ones. Krusen in his paper divided ultra-violet rays into two groups, one having a stimulating and the other a lethal effect, the former being caused by ultra-violet rays of more than 2,900 Angström units and the latter by those shorter than this. Titus holds that the differentiation of ultra-violet rays into abiotic or lethal radiations is fallacious; he has looked in vain for scarring due to lethal destruction of the skin. After Titus had described the production of large blisters by the water-cooled ultra-violet lamp, Krusen pointed out that it was impossible to produce a blister without producing a lethal effect on the tissue cells. The effects of ultra-violet irradiation may be described as photochemical and biological. Krusen states that the photochemical effect ends with the production of dermatitis and the activation of substances in the skin and possibly in the blood; the biological effects—on metabolism, growth and circulation—last a longer time than the photochemical effects. Woods points out that when radiations whose wave lengths are of the order of those of ultra-violet rays are absorbed, one of the effects produced is a disruption of atomic linkages of complex molecules, with the result that these break up into smaller molecules or even into constituent atoms. The biophysical effects of ultra-violet radiation

¹ Archives of Physical Therapy, April, 1941.

are in his opinion primarily those of an insult to the affected tissues. When we inquire how the tissues respond to this "insult" we are seeking a logical basis for the use of the method. The literature shows that many authorities have agreed that the only consequence established beyond doubt is the elaboration of vitamin D in the body. If this is true, the use of ultra-violet radiation in rickets and in certain disorders of calcium metabolism rests on a scientific basis. Woods is one of those who hold this view. Krusen, in his article of April, 1941, after referring to the commonly held view that a chemical change takes place when ergosterol present as an impurity of the cholesterol of the skin comes into contact with absorbed ultra-violet rays and that this chemical change results in the formation of vitamin D, which is carried into the circulation and exerts its beneficial results, mentions a personal communication received by him from R. S. Harris. Harris points out that animals cannot absorb ergosterol, that ergosterol is a plant sterol and has never been proved to be present in animal tissue. He holds that the ultra-violet irradiation of a human being activates 7-dehydrocholesterol (eleidin) or some similar cholesterol derivative. Eleidin "appears to be the principal activatable sterol, for provitamin, in cholesterol which is the chief sterol of animal fats". Titus in reply to this suggestion mentioned the view of Leonard Hill, that ultra-violet energy does not affect cholesterol in the skin, but that the effect is oxidation of histidine, which is present in normal skin, forming histamine. Here we have considerable difference of opinion in regard to detail, but the general view is that some substance is formed as a result of the action of ultra-violet rays and that this substance has a direct action on the calcium and phosphorus metabolism in rickets.

In regard to the use of ultra-violet rays in conditions other than rickets, much may be written. Krusen published a good account of the therapeutic use of ultra-violet irradiation in *Annals of Internal Medicine* of October, 1940; it is a useful summary of the position. In surgical tuberculosis, and indeed in pulmonary tuberculosis, the method has been beneficial and in some places is in general use. This need not be further discussed; but it must be remembered that the use of the method in these conditions is empirical. The same statement applies to other conditions, such as hypertension and the prevention of the common cold. All the same, in these conditions experts in the use of the method obtain results that are often striking. Woods made a strong statement that should never be forgotten when he wrote that ultra-violet irradiation afforded perhaps the outstanding example of a physical agent whose therapeutic value was firmly established upon both theoretical and observational grounds, and which was nevertheless frequently used in medicine without any basis whatever, scientific, clinical or even empirical. It is so easy to use the method on general principles, because it will "tone up" the patient's body tissues or because it will create a good impression in his mind, that a clear indication should always be sought. The sound clinician is one who uses simple methods on a clear indication for their use and does not put the patient to the expense of treatment with elaborate apparatus when a cheaper method will produce the same result.

Current Comment.

THE EYE: PHYSICS AND PHYSIOLOGY.

It would almost seem that unless they have had the experience of medical education and practice people will fall into the dangerous error of continuing to regard the eye as purely physical apparatus. Indeed, curiously enough, the more highly gifted a man of science is, the more likely he is to regard vision as a branch of optical geometry unless his approach to the study has been through physiology and pathology. It is a very elementary truism to the medical practitioner that the eye is a microcosm in which central nervous system, peripheral nervous system, arteries, veins and capillaries, skeletal and involuntary muscle and several connective tissues play an important part, to say nothing of the complexity of the occipital cortex and the neural interconnections in the brain stem. The issue at stake between optician and ophthalmologist can be brought down to this simple divergence of view. To the optician the eye is a physical instrument; to the ophthalmologist it is a complex organ in which, in health, physiological and psychological factors are as important as the physical. It would be easy to pick out from history instances of wrong procedures and conclusions arising from the study of vision from the standpoint of physics. Sir Isaac Newton resolved white light into spectral colours and reconstituted white light by the mingling of the tints so dispersed, but he failed to grasp the significance of simultaneous and successive contrasts or the effects of colour mixing; indeed the poet Goethe was sounder on the physiological side, though with typical Germanic cocksureness he foolishly opposed Newton's physical analysis. As Abney has pointed out, half the colours seen in a sunset may have no physical existence at all, and yet they are psychological realities. Newton's contemporary, Hooke, estimated the acuity of vision by the ability to detect double stars when separated in the sky by one minute of angular measurement. Hooke himself and the many who have adopted his method and conclusions, failed to make allowance for the tremor of the head on the shoulders, and even should this be prevented by head fixation there is the fine tremor of the eyeball itself; actually the image of a star on each retina is moving to and fro amongst the foveal cones, and calculations concerning visual acuity and cone average distance are therefore unreliable. Both Thomas Young and Helmholtz carried out important researches in natural philosophy; but they were medical men first, and they never made the mistake of neglecting factors which do not operate in the realm of pure physics. It is pleasant to find that one of the founders of physical chemistry, the late W. Ostwald, though without medical or physiological training, steered clear of the mistake of regarding vision as applied geometric optics and, having strong artistic leanings, emphasized the psychological; in fact the twenty-four colours in his colour circle were deliberately chosen as psychologically equidistant.¹ As the late Professor J. S. Haldane pointed out repeatedly, all those colorimeters and photometers in which a variable field is altered to match a fixed field, suffer from the fundamental error that the so-called fixed field, though stable physically, is actually fluctuating owing to retinal fatigue; hence in his haemoglobinometer he recommended constant alternating of the standard with the diluted blood being tested.

When we come to the treatment of eye troubles the employment by opticians of purely optical methods of diagnosis and treatment constitutes in a fair percentage of cases a veritable danger. As every medical student knows today, a vigorous ciliary muscle can mask a hypermetropia needing immediate treatment, whilst the number of cases of failing vision due to retinitis, glaucoma, optic neuritis and the like, which the patient pathetically expects to be cured by glasses, is disquietingly large. To have a legitimate warning to the public ascribed to professional

¹ H. J. Eysenck, "Psychological Aspects of Colour Measurement", *Nature*, May 31, 1941.

jealousy unfortunately hardens the resolve of the man in the street to put his trust in glasses when, as too often is the case, the sick eye is the consequence of a sick body demanding attention in a site remote from the eye itself, or when the eye lesion, if localized, may have nothing to do with the optical arrangements. That the eye should be described in school books as an optical device, and its departures from normal limited to the purely refractive, is helping materially to keep the public unenlightened about the actual facts, perpetuating a false and unjust attitude towards medical science and its practice. Far better that the eye should be omitted altogether from school books than have it registered in the tenacious memory of youth as a physical apparatus.

GLOMUS TUMOURS.

SCATTERED throughout the deeper layers of the true skin, particularly in the hands and feet, are small organs known as glomera. Each glomus consists of a skein of small anastomotic channels supplied by an afferent arteriole and uniting to form a collecting venule. Running in among this vascular skein is a reticulum richly supplied by non-myelinated nerve fibres. Surrounding each individual blood channel of the glomus is a layer of large pale-staining cells with rounded nuclei, the "glomus" cells or "epithelioid" cells. It is thought that the glomera form an alternate channel by which the blood, instead of passing through the skin capillaries, can be short-circuited from artery to vein, a channel intimately controlled by the autonomic nervous system. There is thus produced a mechanism by which the amount of blood flow through the skin of the hands, and to a less extent other parts, can be controlled. The hand, with its large skin surface, is an excellent radiator of heat; but heat loss depends on cutaneous blood flow. The possible importance of the glomera in controlling heat loss by short-circuiting blood from the skin capillaries is plain.

It occasionally happens that one of these tiny organs undergoes a benign neoplastic change to form a little tumour. When this happens a very typical syndrome is produced. Though the condition is distinctly uncommon, five separate examples have recently been described from Toronto, Canada.¹ A. J. Blanchard reports three cases and describes the pathology of the lesion. J. H. Couch and B. Plewes each report a case of unusual interest. The outstanding complaint is of pain originating in the region of the tumour. Usually the tumour can be felt as a small round subcutaneous swelling, which may become as large as a pea, but may be so small as to be found and palpated only with difficulty. Indeed the tumour can probably cause pain before it can be palpated at all. Pressure, even very light pressure, on the tumour causes exquisite pain, which may shoot up the limb. Excessive sweating in the affected region is common, and vasomotor or trophic changes may be present. Even Horner's syndrome of paralysis of the cervical sympathetic outflow may accompany a glomus tumour of the hand. The particular interest of Couch's case lies in the fact that the tumour was situated in the nail-bed of a finger, and though causing intense pain whenever the nail was touched, the tumour could not be palpated. The hand was soft, flushed and sweating excessively, and Horner's syndrome was present. The patient had visited doctors "all the way from Harley Street to Toronto", but was cured by removal of the portion of nail-bed bearing the tumour. The patient described by Plewes had four separate small tumours in one finger. This finger was smaller than normal, and its surface was dusky and sweating. Again removal of the tumours effected a cure of the pain. Plewes claims that only five other examples of multiple glomus tumours have been reported. The tumours, as described by Blanchard, show an increased number of vascular channels and hyperplasia of the glomus cells. Surrounding the tumour is a collagenous capsule, and in this and in the tumour itself are many non-myelinated nerve fibres.

These uncommon little tumours have a very real clinical interest. Their greatest interest, however, lies in the light they throw on the function of the glomus. There seems little doubt that the structure has an intimate relationship with the autonomic nervous system, for the local sweating and flushing and the Horner's syndrome produced by glomus tumours depend on autonomic nervous activity. Couch reasons that the glomera are more important than the capillaries in controlling cutaneous blood flow and heat loss. Certainly it is easier to demonstrate a nerve supply to the glomus than to the capillary. The blanching of the hand on exposure to cold is due, he suggests, to dilatation of glomera with deviation of the blood flow, rather than to active capillary contraction. Whether this is true or not, we cannot say, but it is interesting and reasonable. There seems little doubt that the glomus is an important enough structure to deserve from the physiologists more attention than it has so far received. There is still much to be learnt about peripheral vascular control and disease, and a study of the glomus may yield knowledge that is more than local.

IMMUNIZATION IN ROCKY MOUNTAIN SPOTTED FEVER.

ROCKY MOUNTAIN spotted fever is one of the rickettsioses or the typhus group of diseases. It is carried by ticks of the genus *Dermacentor*. In some areas it is highly lethal. For some fifteen years a vaccine made from the tissues of infected ticks has been used to immunize people in endemic regions. R. R. Parker has recently reported the results of this method of immunization.² The vaccine contains the killed virus from one and a quarter ticks in each cubic centimetre. Two injections of two cubic centimetres each are given at an interval of five days. This is repeated every twelve months. Parker excludes children from his consideration of the results of vaccination, because children do not usually suffer very severely. Adults who have not been vaccinated within twelve months are not regarded as vaccinated. In the western part of Montana, where the mortality rate has always been very high, 55 adults suffered from Rocky Mountain spotted fever during ten years prior to the institution of vaccination, and 41 died. During the fifteen years in which vaccination was used, 95 adults were reported as having the disease. Fifty-one had not been vaccinated, and 42 of these had died. Of the remaining 44, only 37 had been vaccinated within twelve months of acquiring the infection, and of these, only three died. This is striking testimony to the value of vaccination in an area in which formerly the victim was very likely to die. Vaccination was tried in an area of Idaho, where the incidence was fairly high but the mortality rate was low. Over a period of two years only one of 193 vaccinated men (and he had received only one injection) suffered from the disease, against 22 of 364 controls. The investigations showed that a person who had been vaccinated regularly for several years had a higher degree of immunity than a person who had been vaccinated in one year only. Full protection is frequently obtained against strains of low virulence, but seldom or never against the more virulent strains, except perhaps in children. If infection takes place during the period of immunization (that is, soon after vaccination) the chances are that the symptoms of the subsequent disease will be considerably mitigated, even if the infecting organism is highly virulent. In areas where the infection is mild and the incubation period long, the administration of vaccine soon after bite by a tick "may ameliorate an impending infection". In certain coastal districts of Queensland and several regions in New Guinea various forms of endemic typhus, masquerading under a number of loose titles, are known to occur. Much valuable work in the epidemiology and immunology of the rickettsioses in these areas has been done; but there are still many problems demanding solution. Medical men engaged in private or public health practice in endemic zones might benefit from a study of Parker's article.

¹ The Canadian Medical Association Journal, April, 1941.

² The American Journal of Tropical Medicine, May, 1941.

Abstracts from Medical Literature.

SURGERY.

Carcinoma of the Ampulla of Vater.

L. RIVER, R. W. McNEALY AND A. B. RAGINS (*The American Journal of Surgery*, May, 1941) report three cases of carcinoma of the ampulla of Vater in which treatment by resection was adopted. This is a condition which may easily be confused with carcinoma of the head of the pancreas or with stone impacted in the ampulla of Vater. Because of its position it produces quite early a severe degree of biliary and pancreatic obstruction. Crohn has noted that many such tumours found at autopsy and causing the death of the patient were still small, freely movable and resectable, and without metastases. In the diagnosis of the condition the ampulla is recognized as the site of the lesion by the absence of pancreatic ferments as well as of bile from the duodenal contents. In the differentiation between stone in the ampulla and carcinoma it is noteworthy that in carcinoma blood is usually found on examination of the stool. X-ray examination is not helpful as a rule. A tumour large enough to be demonstrable by this method is probably inoperable. The necessity for early laparotomy in cases of obstructive jaundice is stressed. The preparation for this should commence as soon as the patient is admitted to hospital. Pre-operative treatment should include administration of vitamin K, bile salts and glucose, and the giving of transfusions. At laparotomy in any doubtful case, in addition to the usual exploration, the duodenum should be mobilized and palpated, and if necessary opened for inspection of the ampulla. For the small early tumours one-stage resection through a vertical incision in the duodenum is recommended. The common bile duct and the pancreatic duct are resutured to the mucosa. This procedure is sometimes followed by stricture formation round the ducts, and this may later necessitate cholecyst-enterostomy. In the more advanced cases it is possible to resect portion of the head of the pancreas if this is invaded, but it is doubtful whether these extensive operations will produce results to justify them. As a palliative measure cholecyst-enterostomy should be performed.

Constrictive Occlusion of the Superior Vena Cava.

H. K. GRAY AND I. C. SKINNER (*Surgery, Gynecology and Obstetrics*, May, 1941) discuss constrictive occlusion of the superior vena cava and report three cases. In all, fewer than 400 cases of this condition have been reported. In occlusion of this vessel the resultant increase in venous pressure in the upper half of the body gives rise to a characteristic clinical picture. Oedema of the face, neck and upper extremities becomes a distressing feature. The oedema is at first intermittent and is aggravated by recumbency and relieved by the erect position. Cyanosis may occur and the retinal vessels may show evidence of venous stasis. Dyspnoea is a feature, and increased cerebro-spinal fluid pressure may cause headache.

Other symptoms which have been noted include vertigo, deafness, tinnitus, somnolence and Jacksonian epilepsy. Two anatomical varieties of superior vena cava obstruction are recognized: those where the site of the obstruction is above the azygos vein and those in which it is between the entrance of the azygos vein and the right auricle. The distinction is an important one, as in the first group the facilities for the establishment of a collateral circulation are much greater. The cases may also be distinguished clinically. In the first group there are dilated collateral vessels in the upper part of the thorax only, the blood making its way to the intercostal veins and through them to the azygos system. In the second group the blood must be shunted to the inferior vena cava system and long collateral vessels may be seen running from the upper part of the thorax as far as the inguinal regions. As might be anticipated, the symptoms are more severe in the second group. The commoner pathological causes of obstruction of the superior vena cava are thrombosis due to vascular disease, and external pressure from tumours of neoplastic, inflammatory or aneurysmal origin. When the condition is suspected, thorough radiographic examination of the thorax must be made, together with estimations of circulation time and direct venous pressure. These observations, and especially the estimation of direct venous pressure, may be repeated and afford an indication of the progress of the condition. The authors believe that only those individuals who, over a period, show increasing venous pressure, should be subjected to mediastinotomy. Some patients may be relieved by non-operative methods. If the condition has a syphilitic basis, retrogression may be caused by anti-specific remedies. Radiosensitive mediastinal growths may be attacked with deep therapy. A symptomatic improvement sometimes follows the removal of several hundred cubic centimetres of blood from one of the tributaries of the superior vena cava system. The authors report in detail three cases of superior vena cava obstruction in which surgical treatment was used.

New Developments in the Treatment of Compound Fractures.

G. A. CALDWELL (*Annals of Surgery*, May, 1941) discusses new developments in the treatment of compound fractures. The contribution appears in a number of this journal which has been devoted to surgical preparedness, and the writer considers the treatment of compound fractures with special reference to military surgery. He emphasizes the importance of differentiating at once between fractures likely to have been contaminated by cultivated soil and in which there is much tissue damage, and those fractures produced by indirect violence, with only a small wound which is likely to be free from gross contamination. Statistics on the merits of any method of treatment are without value unless this differentiation is made. The fundamental importance of adequate splinting of compound fractures remains unchallenged, and the author questions the older views on the inadvisability of replacing projecting bone ends during first-aid treatment. He considers that traction splints, where appropriate, have such great advantage that this consideration

should not exclude their use, especially as it is universally agreed that *débridement* must be carried out in the treatment of these fractures on the patient's arrival at hospital. The author stresses the need for the avoidance of delay in the *débridement* of compound fractures. While the patient's general condition in regard to shock must receive the closest attention, it will often be found possible to carry out resuscitation measures concurrently with local treatment. Internal fixation of fractures is not regarded as contra-indicated, provided that a complete armamentarium is available and that sulphanilamide implantation is also used. In regard to skin preparation, the author recommends the simpler methods and avoids elaborate washing of the area and irrigation of the wound. He briefly reviews the question of the local implantation of sulphanilamide. He concludes that it is without harmful effect on tissues, but that its effect on anaerobic organisms, and on *Bacillus welchii* in particular, is limited, a view which he bases on clinical reports and on personal experimental observations. He considers that it is unwise to close wounds after *débridement* when extensive tissue damage and soil contamination have occurred, even when sulphanilamide is used locally or is given by mouth. Extensive lacerations over subcutaneous bones, such as the tibia, may be sutured, provided counter incisions of adequate length are made elsewhere through skin and deep fascia and extending to the site of fracture. Wounds of joints may, as a rule, be treated by *débridement*, washed and sutured, even in the presence of gross dirt, because the joint structures provide a poor culture medium for the propagation of gas bacilli. Clinical observations and experimental work have convinced the author that X-ray therapy is unreliable in the treatment of gas gangrene infections, although it may, under certain conditions, have some retarding effect.

Disorders of the Common Bile Duct.

MOSES BEHREND (*The Journal of the American Medical Association*, January 18, 1941) reviews some of the disorders involving the common bile duct. He lists the usual symptoms as pain, nausea, vomiting and eructations of gas. Jaundice may be an early or late sign. It may not be present with chronic pancreatitis, but, if present, gives a mild yellow tinge. Jaundice due to stones or carcinoma of the head of the pancreas causes an intense yellow colour. The icterus index is of value because it is lower in chronic pancreatitis than in complete obstruction of the bile duct. When painless jaundice with a distended gall-bladder occurs, carcinoma of the head of the pancreas should be suspected. Fever suggests infection of the biliary tract, and jaundice may occur if the tract is occluded. Obstruction of the duct by chronic pancreatitis is usually unrelieved by drainage and, according to the author, should be treated by anastomosis of the gall-bladder to the stomach or duodenum.

Brain Tumours.

G. HORRAX (*The New England Journal of Medicine*, February 20, 1941) reviews a series of operations on patients suffering from what he describes as "favourable brain tumours". His object is to note the survival rate in these cases and the ability of the

survivors to lead a useful life after operation. He defines favourable tumours as those which, by virtue of their nature and position, should be capable of complete and permanent removal. He therefore includes meningioma, which were the commonest type, acoustic neuromata, pituitary adenomata, gliomata, and a miscellaneous group including pineal tumours, haemangiomas, cysts *et cetera*. In a short discussion of the operative methods the author mentions that meningioma are removed with the dura over the growth, and possibly with considerable lengths of the longitudinal and lateral sinuses, and large areas of skull. In order to approach meningioma in the olfactory groove it may be necessary to remove portions of the frontal lobe. In the treatment of acoustic neuromata the whole tumour should be removed completely; this is preferable to the older operation of intracapsular extirpation, which always led to recurrence. The resulting facial palsy may be largely corrected by nerve anastomosis. Pituitary adenomata are attacked by turning down a frontal bone flap. The tumour and its capsule are removed. The old operation of transphenoidal approach has been practically discarded. Among the 224 patients with favourable tumour, 27 operative deaths occurred (12%), and 10 patients died subsequently, leaving 187 who have survived from one to eight years. Of these, 27 have major disabilities which prevent them from leading useful lives. Such disabilities include blindness, motor paralyses and convulsions. In many the disability was due to the late performance of operation. For instance, many of the patients with pituitary tumour had optic atrophy before operation. But 160 patients still remain who are leading useful lives with little or no functional loss. This represents 71% of the original 224 group with favourable tumours. The author points out that the medical profession and the public should realize that there is a hopeful side to brain surgery and that a large percentage of patients are curable.

The Treatment of Parotid Tumours.

HAMILTON BAILEY (*The British Journal of Surgery*, January, 1941) considers that the prognosis in parotid tumours should be excellent. In many cases the mixed parotid tumour is only potentially malignant and is confined within a capsule. Even when this is so, statistics indicate that recurrences have occurred in 30% of cases. Furthermore, when the tumour has broken through its confining capsule, it remains for many months only locally malignant. The author is surprised, therefore, to find that the end results are so depressing. He thinks that surgical enterprise in these cases has been stultified by two fears, that of injury to the facial nerve and that of salivary fistula formation. He deprecates the tendency to treat these tumours with irradiation; tumours consisting of such highly differentiated cells respond poorly. His own experience has been that this form of treatment has been futile or even harmful. Complete surgical removal is therefore recommended. For this purpose adequate exposure is essential. Blair's incision is the best and gives a good cosmetic result. In some cases complete excision of the tumour is then possible, a surrounding portion of normal gland being

included. This makes it unnecessary to open the capsule. If the capsule is to be opened, the wound should first be flooded with 60% alcohol or 50% zinc chloride solution. After the capsule is opened and the tumour has been enucleated, the capsule is then completely excised by sharp dissection. Salivary fistulae are extremely unusual, and the fear of these should not act as a deterrent to the surgeon. The author observes in regard to the anatomy of the region, that the facial nerve does not traverse the substance of the gland. The gland in fact consists of a large superficial portion and a smaller deep portion, joined by a neck, thus resembling a collar stud. The two main branches of the facial nerve pass respectively above and below this neck, lying between the superficial and deep portions, but not passing through the gland substance. Complete extirpation of the gland is therefore possible without facial nerve injury. The technique of the operation is described in detail. Even where there is wide involvement of the gland by growth, so that injury to the nerve during parotidectomy is a definite danger, this should not contraindicate operation. Two reasons for this are that facial palsy frequently occurs because of increasing pressure of the tumour on the nerve even if surgery is withheld, and secondly, that plastic methods can considerably minimize the effects of a facial lesion.

Tuberculosis of the Caecum.

R. ADAMS AND L. J. PARSONS (*The New England Journal of Medicine*, February 20, 1941) review a series of 38 patients suffering from tuberculosis of the caecum, who were seen in a general hospital over a period of fifteen years. The lesion usually gives rise to a slowly progressive subacute illness beginning with occasional colicky pains in the umbilical and right iliac regions. These are often relieved by pressure over the abdomen or by the passage of flatus or a bowel action. In the younger patients diarrhoea is frequently observed, while older patients complain more of constipation. Blood is more frequently found in the stools of the younger patients. These facts are due to the tendency of the disease to assume the ulcerative type in the young patient while conforming more to the hyperplastic type in later life. In either case progressive symptoms of intestinal obstruction develop. Loss of weight and emaciation are marked. The blood picture, however, remains fairly satisfactory, in contradistinction to the findings in carcinoma of the caecum, where anaemia is often profound, even in the early stages. Radiological examination after use of a barium enema may reveal incomplete filling of the caecum with rigidity and deformity of the ascending colon. Half of the patients in this series had no clinical or radiological evidence of pulmonary tuberculosis. The diagnosis is often confused by a suspicion of carcinoma of the caecum. The blood picture, as mentioned earlier, may be of assistance. But if doubt exists, laparotomy should be performed. Even then difficulty may be encountered, though involvement of the ileum and evidence of tuberculosis elsewhere in the abdomen may help. When the condition is diagnosed, judgement is necessary as to what should be done. Resection in active cases is likely to be disappointing. Appendectomy should be avoided, as it is liable to lead to

persistent faecal fistula. For acute obstructive symptoms ileostomy may have to be performed. The wisest procedure appears to be to close the abdomen if the disease is active and to institute good sanatorium care. This is especially the case when a second active focus exists—for instance, in the lungs. At a later stage, when the disease is quiescent, obstructive symptoms may require anastomosis. Apart from these late sequelae, operative interference should be undertaken only for diagnostic purposes and for treatment of acute intestinal obstruction.

Pathology of Experimental Shock.

J. E. DUNPHY AND J. L. KEELEY (*Surgery, Gynecology and Obstetrics*, May, 1941) set out to investigate the bases of the circulatory changes in experimental traumatic shock. They experimented on dogs, keeping them during the experiment under anaesthesia induced by the intravenous method. Shock was induced either by burning the abdominal wall or by crushing a hind limb, and observations were made of blood pressure, total blood volume, plasma volume and haematocrit reading. At the conclusion of each experiment the animal was sacrificed and a post-mortem examination made. Control experiments indicated that the intravenous administration of the anaesthetic did not appreciably alter the results obtained. Dunphy and Keeley found that in early shock, that is, after two to three hours, the fall in blood volume and the haemoconcentration were accounted for by a loss of fluid from the circulation at the site of injury and were unaccompanied by any generalized capillary changes. In secondary shock, however, the authors found pathological evidence of generalized capillary injury and loss of fluid throughout the viscera. They considered this to be a secondary rather than a primary phenomenon.

The Post-Operative Use of Morphine.

HAROLD NEUHOF (*The Journal of the Mount Sinai Hospital*, March-April, 1941) describes a method for the continuous intravenous administration of morphine after operation. He lists the undesirable features of hypodermic morphine therapy as (a) an extreme immediate effect, (b) too short a period of relief, (c) considerable restlessness, discomfort and pain between doses, (d) a more or less stuporous state caused by too frequent administration, (e) undue strain on operation fields because of restlessness when the drug is too infrequently given. The author's procedure is as follows. The adult patient is given a hypodermic injection of morphine sulphate, one-quarter of a grain, before operation. The continuous intravenous apparatus is arranged so that the patient receives 100 cubic centimetres of saline solution per hour, the patient receiving one-sixteenth of a grain of morphine sulphate in this amount of saline solution. This continuous injection is commenced immediately after operation. If complete relief is not obtained, the amount is increased to 150 cubic centimetres per hour (one-tenth of a grain of morphine sulphate). Intravenous medication has been continued from twenty-four to thirty-six hours. None of the undesirable features associated with hypodermic injections were present and a remarkable state of well-being in all patients was noted.

British Medical Association News.

SCIENTIFIC.

A MEETING of the Victorian Branch of the British Medical Association was held on June 18, 1941, at Saint Vincent's Hospital, Melbourne. The meeting took the form of a number of clinical demonstrations by members of the honorary medical staff of the hospital. Part of this report appeared in the issue of August 16, 1941.

Herniation of the Nucleus Pulposus.

Dr. E. P. MORGAN showed a male patient, aged twenty-seven years, who gave a history of intermittent pain, of eight years' duration, beginning in the lower portion of the lumbar spinal region and radiating to the left buttock, knee and foot. Examination revealed slight wasting and loss of tone in the muscles of the left ham and calf and in the anterior tibial muscles; Lasègue's sign was present. The deep and superficial reflexes of the lower limbs were normal. Movement of the lumbar part of the spine, which had developed a moderate degree of dextro-convex scoliosis, was considerably limited. The cerebro-spinal fluid was normal. X-ray examination of the lumbar part of the spine after the instillation of lipiodol revealed a filling defect on the left side between the fourth and fifth lumbar vertebrae, at the level of the intervertebral disk; the filling defect had the classical appearance of herniation of the *nucleus pulposus*. At operation in February, 1941, the herniated nucleus, which was about the size of a pea pod, was removed. Some pain persisted in the outer aspect of the left leg, but this had become less severe with each week, and at the time of the meeting it was not troublesome.

Enlargement of the Ligamentum Subflavum.

The sixth patient shown by Dr. Morgan was a male, aged thirty-three years. Fifteen months earlier he had strained his back whilst lifting a bag of wheat. For ten days afterwards he had pain in the small of his back. Fourteen months later he strained his back again whilst lifting a bag of flour, and since then he had fairly constant pain in the small of the back, in the right hip, in the buttock and in the calf of the right leg. The pain was worse when he coughed or bent over. Examination revealed dextro-convex scoliosis of the lower thoracic and lumbar portions of the spine, a moderate degree of limitation of movement of the lumbar part of the spine and tenderness over the spinous processes of the fifth lumbar vertebra. There was no alteration in the power of the lower limbs, the reflexes of which were normal. Lasègue's sign was present on the right side. Sensation for light touch and pin prick was slightly diminished on the outer aspect of the right foot. X-ray examination revealed a small *spina bifida occulta* of the first sacral vertebra and slight diminution of the intervertebral joint space between the fourth and fifth lumbar vertebrae on the left side. Lumbar puncture was performed between the fourth and fifth lumbar vertebrae, and the cerebro-spinal fluid withdrawn contained 130 milligrammes of protein per 100 cubic centimetres. Queckenstedt's test provided no evidence of spinal obstruction. Five cubic centimetres of lipiodol were injected into the spinal canal, and X-ray examination revealed a general constriction of the spinal subarachnoid space at the level between the fourth and fifth lumbar vertebrae. The appearances were as if a piece of string had been tied loosely round the spinal membranes. The suggested diagnosis was enlargement of the *ligamentum subflavum*, although clinical examination had suggested that the lesion was herniation of the *nucleus pulposus*. The enlarged ligament, extending from one intervertebral foramen to the other, was removed; no associated disk protrusion was seen. The pain was instantly removed.

Pott's Disease of the Spine.

Dr. Morgan's next patient was a male, aged thirty-nine years. Since the age of seven years he had suffered from tuberculous disease of the spine. At the age of seventeen years he had weakness of the legs, power being regained after eight months' rest. Seven years later a similar incident occurred. The patient was admitted to hospital in November, 1939. Three and a half months before his admission he complained of girdle pains about the region of the lower ribs, worse on the left side than on the right. Six weeks later numbness and weakness of the lower limbs appeared and reduced the patient in three weeks to a bedridden state. Micturition was not disturbed. The spinal column was so deformed that it presented two right-angled bends, one at the junction of the cervical and thoracic

segments of the cord, the other in the lower thoracic region. The greater part of the thoracic section of the spine lay parallel to the ground when the patient was erect. There was no evidence of activity of the bony disease. Lumbar puncture studies indicated complete spinal obstruction; X-ray examination after the injection of lipiodol seemed to show that this was situated at the deformity in the lower thoracic region.

Laminectomy was undertaken on account of the severity of the paraplegia in the presence of spinal obstruction. The findings at the site of operation were inconclusive. There was no extradural granulation tissue and the dura was not affected; but the narrowed spinal cord had a faint greenish-yellow hue. At the summit of the deformity it seemed that the laminae might be producing pressure on the cord; the space between the laminae and the dura was certainly narrowed. The most important observation made at this operation was that a rubber catheter, passed upwards in the spinal subarachnoid space, was blocked at the cervico-thoracic deformity.

The patient did not stand the operation well; he nearly died from shock. A few weeks afterwards the sensory loss had almost disappeared and the spasticity of the limbs had greatly lessened; yet he never recovered sufficiently to leave his bed. He was sent home to rest. His condition remained stationary for four months, after which the paralysis of the lower limbs reappeared; it was complete in eight months after the first operation. Spinal block was again found to be present. Under local anaesthesia with a 1% solution of "Novocain" the region of the cervico-thoracic deformity was explored; this was the region of obstruction to the passage of the catheter at the first operation. The laminae of the second, third, fourth and fifth thoracic vertebrae were removed. They were in intimate contact with the dura, which was normal. The spinal cord was a little shrunken and the subarachnoid space was quite dry. No pulsation of the cord was seen. Immediately the upper border of the second thoracic lamina was removed and the dura in this vicinity was opened, cerebro-spinal fluid flowed freely from above and movement appeared in the cord, previously pulseless and dry. In contrast to the effect of the first operation, in which nitrous oxide and oxygen anaesthesia was used, the patient stood the second operation well. He quickly regained the use of his lower limbs. At the time of the meeting, nine months after the second operation, he was able to walk three or four miles a day. The spinal column had suffered no additional deformity from the two laminectomies. Bone grafting was not carried out. Dr. Morgan said that it seemed probable that the paraplegia was produced by the actual spinal deformity. This could not be decided before operation, and grave misgivings were entertained as to the advisability of suggesting operation. The patient's poor physiological condition, the proper preference for conservative treatment and the well-known dangers of laminectomy for Pott's paraplegia caused much hesitation in the making of a decision as to treatment. The progressive paraplegia in the presence of obstruction eventually decided the course to be pursued. Disaster nearly resulted from the patient's poor general condition; but it seemed that laminectomy directly brought about his great clinical improvement.

Acidophile Pituitary Adenoma; Acromegaly.

Dr. Morgan then showed a male patient, aged thirty-nine years, whose chief complaint was of violent headache, in the forehead and at the back of the eyes. He had suffered from headache for many years, but during the past six months the pain had become excruciatingly severe. Examination revealed that the man had the typical physical characters of acromegaly. He had not observed that his hands and feet had become large, his lower jaw had begun to protrude and the skin of his body had become coarse and thick; it was only when his attention was drawn to these features that he recognized the change that had occurred. There was no optic atrophy, nor were the visual fields affected. Examination of the nervous system revealed no abnormality. X-ray examination of the skull revealed that the pituitary fossa was moderately enlarged, particularly in the antero-posterior diameter. Dr. Morgan said that the patient was to receive deep X-ray therapy for the relief of his headache.

Traumatic Epilepsy.

The ninth patient shown by Dr. Morgan was a female, aged twenty-one years, who had been shown two years previously at a meeting of the Victorian Branch of the British Medical Association at Saint Vincent's Hospital. The patient had sustained injuries to the scalp, skull and brain, and two years later she began to suffer from epileptic seizures, accompanied by turning of the head and

eyes to the left. Just before her admission to hospital, two years after the onset of epilepsy, the fits had become so frequent as to number thirty during the course of a week-end. The consequence of these repeated seizures was a state of confusion and amnesia, which lasted from seven to ten days. No sooner did the patient recover from the confused state than another bout of fits prostrated her; she was thus almost entirely incapacitated. The site of the injury to the skull and brain was the right frontal region. A scar was presumed to be present in the right frontal lobe. Operation was undertaken to deal with the scar, the complete removal of which necessitated the removal of the anterior half of the frontal lobe. Since the operation, in October, 1938, the epileptic seizures had completely ceased.

Chromophobe Adenoma of the Pituitary Gland.

Dr. Morgan then showed a male patient, aged thirty-four years. The first sign that he harboured an intracranial tumour was the development of antisocial tendencies; he was arrested and taken to court for physical assault. After the trial his physician observed that the left plantar reflex was extensor in type, and sent the patient to hospital for investigation. The history extended over two years; it related chiefly to frontal headache, diplopia, weakness, tiredness and loss of weight. Whereas six years earlier the patient had been the strongest man in his country town, he had become unable to undertake physical work. A loss of two stone in weight accompanied the gradually oncoming weakness. Other symptoms were diminished sexual power and gradual loss of the pectoral, axillary and pubic hairs.

Examination revealed a sallow-complexioned man with soft, finely wrinkled skin. The bodily hair was scanty. The function of the first three cranial nerves was impaired. Bilateral relative anosmia, bitemporal hemianopia with bilateral optic atrophy and paresis of the right third nerve were present. The left plantar reflex was extensor in type. The cerebro-spinal fluid protein content was increased to 50 milligrammes per 100 cubic centimetres. An X-ray examination of the skull revealed an enormous enlargement of the pituitary fossa, obliteration of the sphenoidal sinus and complete destruction of the *dorsum sellae* and the posterior clinoid processes. These findings, together with the third nerve palsy and impaired function of the right pyramidal tract, indicated the presence of a pituitary tumour with intracranial extension.

Operation was undertaken and a considerable amount of the tumour was removed; but it was impossible to remove it all. When the operation wound had healed the patient was given a course of deep X-ray therapy. Dr. Morgan said that the result of the treatment was to make the patient fit to work as a gardener, to decrease the visual field defect (the bitemporal hemianopia) and to restore his weight almost to normal. The operation and deep X-ray treatment had been undertaken one year earlier.

Meningioma of the Right Cerebello-Pontine Angle.

Dr. Morgan's next patient was a female, aged forty-five years. Increasingly severe headache and vomiting, unsteady gait and giddiness had brought her to a state in which she was unable to continue with her housework. The first symptom, headache, had appeared eighteen months before her admission to hospital; during that time she had lost two and a half stone in weight.

Examination revealed bilateral papilloedema and a slight weakness of the lower right part of the face. Dysmetria, hypotonia and disidiadokinesia of moderate degree were present in the limbs on the left side and to a slight degree in the limbs on the right side. The patient showed a past pointing phenomenon to the left and an ataxic gait with deviation to the left side. Slight signs of increased intracranial pressure were revealed by X-ray examination of the skull. A diagnosis of left-sided cerebellar tumour was made. Suboccipital craniectomy revealed a large meningioma, weighing about 40 grammes, in the right cerebello-pontine angle, attached to the lateral portion of the superior petrosal sinus. The tumour was completely removed and the patient made a good recovery from all her symptoms. There was never during her stay in the hospital the slightest sign indicating a lesion in the right cerebello-pontine angle.

Dr. Morgan also showed a male patient, aged forty-three years, who had had a meningioma of the right cerebello-pontine angle. The symptoms were those of a right cerebellar disorder with a suggestion that the brain stem was involved. For example, there occurred a sudden attack of headache, vomiting and diplopia, associated with paraesthesia in the right side of the face and the left side of the body. Along with this sudden phase, six months before the patient sought medical advice there was an indefinite history of gradually

progressive lassitude, tiredness and occasional headache of two years' duration.

Examination revealed slight signs of a right-sided cerebellar lesion and haemorrhages in both optic fundi. Two weeks after the retinal haemorrhages were observed swelling of the optic disks appeared. The blood pressure was 170 millimetres of mercury systolic and 110 diastolic. The cerebro-spinal fluid pressure was 200 millimetres of water. Ventricular estimation disclosed symmetrical hydrocephalus with increased intraventricular pressure. Exploration of the posterior fossa brought to light a large meningioma in the right cerebello-pontine angle, attached to the lateral sinus. The tumour occupied the greater part of the right half of the posterior fossa. It displaced the brain stem to the left and was itself covered by the greatly attenuated right cerebellar hemisphere. The retinal haemorrhages, papilloedema and headache disappeared and the blood pressure receded to 150 millimetres of mercury systolic and 100 diastolic after the removal of the meningioma. Despite some residual giddiness, the patient returned to his work as bricklayer.

Right Cerebellar Tumour without Localizing Signs.

Dr. Morgan's next patient was a male, aged thirty-two years, who for four months had suffered from increasing and almost continuous headache. Vomiting, anorexia and constipation were prominent symptoms. During the month before his admission to hospital he lost one stone in weight. While he was in hospital symmetrical swellings of the optic disks developed, but there were no physical signs to suggest the location of the intracranial tumour from which he suffered. Two weeks after the appearance of the papilloedema and a few days before operation slight ataxia was found in the right upper limb and a slight degree of nystagmus appeared on conjugate deviation to the right. Because it was thought that the intracranial pressure was exceedingly high (it was found at operation that the ventricular pressure was more than 600 millimetres of water), these signs were not held to have any accurate localizing value. Ventriculography revealed asymmetrical dilatation of the lateral and third ventricles; the iter of Sylvius was also dilated and an obstruction to the passage of air was found at the lower end.

Operation was performed under local anaesthesia. Just as the dura was exposed the patient ceased to breathe. By rapid opening of the dura and removal of the arch of the atlas vertebra, it was possible to release from the spinal canal a great herniation of the right cerebellar tonsil, which extended as low down as the second cervical vertebra. Immediately the herniation was released and the medulla was freed from compression, respiration was resumed. A large tumour occupying the right cerebellar lobe was rapidly removed by suction. No pieces were obtained for microscopic examination; it had to the naked eye the appearance of a soft astrocytoma. The patient made a good recovery and at the time of the meeting was free from symptoms.

Left Parieto-Occipital Cystic and Solid Astrocytoma.

Dr. Morgan finally showed a female patient, aged fourteen years, whose illness had begun one month before her admission to hospital. First she suffered from attacks of vomiting, and soon severe headache in the frontal region of the skull and the vertex caused her great distress. One week before her admission to hospital she complained of blurred vision in the right eye.

Examination revealed bilateral papilloedema and right homonymous hemianopia. X-ray examination revealed a nodule of calcification, about the size of a small marble, in the region of the *gyrus precuneus* of the left cerebral hemisphere. This site was explored. A large cystic and solid tumour was found in the depth of the left hemisphere in the parieto-occipital region. The cyst was evacuated and the large mural nodule present in its depth was removed. The tumour proved on section to be an astrocytoma. Dr. Morgan said that since its removal six months earlier the patient's headache and vomiting had disappeared, but the hemianopia still remained. She was well able to undertake ward duty at the hospital and had been symptom-free except for one slight sensory seizure, during which she was unable to recognize her surroundings or her friends.

Sulphapyridine Therapy.

DR. M. V. CLARKE, on behalf of Dr. F. NIALl, showed two patients to illustrate the use of sulphapyridine therapy. The first, a male patient, aged forty-nine years, had been admitted to hospital with a four days' history of rigors and general tremors accompanied by severe constant frontal and occipital headache. On examination he was drowsy, though easily aroused; pronounced neck stiffness was present and Kernig's sign was elicited on both sides. The

temperature was normal. Lumbar puncture revealed that the cerebro-spinal fluid was under a pressure of 160 millimetres. The fluid was turbid, containing 12,000 polymorphonuclear cells per cubic millimetre. Gram-negative intracellular and extracellular diplococci were revealed by staining.

The diagnosis of meningococcal meningitis having been made, sulphapyridine therapy was instituted. A course lasting nine days, involving large doses (three tablets every four hours for four days, followed by gradually decreasing doses) was given, the total dosage being 60 grammes. Lumbar puncture was performed every day for five days until the symptoms abated. No intolerance to the sulphapyridine was shown, the number of white cells in the blood remaining at 15,000 per cubic millimetre. For the ensuing ten days the patient was comparatively well, though he complained of occasional headache, and slight neck stiffness was still present. Then all the original symptoms and signs recurred and meningococci were grown on culture from the cerebro-spinal fluid. A second course of sulphapyridine was given, totalling 64 grammes, and the patient then made a rapid, complete recovery. Three months later he was still in perfect health, with no residual symptoms. In all, the patient received 124 grammes of sulphapyridine without showing any intolerance.

The second patient was a male, aged thirty-two years, who had been treated for some months for chronic ulceration of his legs, with little success. He was admitted to hospital in a deeply unconscious condition, with a history of sudden onset of rigors, delirium, headache and incontinence of urine ten hours previously. His temperature was 106° F. The important clinical findings were divergent strabismus, a "mouse-like" breath and a spleen palpable two inches below the costal margin. On the left leg was an angry-looking chronic ulcer, with evidence of previously healed ulcers. Generalized rigidity of all limbs and the jaw prevented full examination. Lumbar puncture revealed no abnormality. Blood taken for culture on his admission to hospital yielded a growth of haemolytic streptococci two days later.

As no definite diagnosis could be made at first, sulphapyridine therapy was begun as an empirical measure. In spite of intensive chemotherapy, gastric lavage and the intravenous infusion of saline solution, the patient was deeply unconscious and rigid for four days. His temperature, however, was normal by the third day. On the fourth day his general condition suddenly improved, he became conscious and was able to take nourishment by mouth, and catheterization was no longer necessary to control incontinence of urine. From that day the ulcer on his leg healed rapidly.

An interesting feature was that for some months previously he had had a leucopenia (the leucocytes numbered 2,000 per cubic millimetre and the differential count was normal) and an enlarged spleen. During the streptococcal septicaemia the number of leucocytes rose to 6,800 per cubic millimetre, 90% being polymorphonuclear cells; but on his recovery the blood picture returned to its original state, the haemoglobin value, which had dropped from 80% to 70%, rising to 85% on his discharge from hospital. During convalescence "Pentnucleotide" and liver therapy had no effect on the leucopenia. Sternal puncture revealed a normal erythrocyte series but poorly staining myeloblasts with very few granules. They gave a strongly positive peroxidase granule stain. It appeared that the condition was a mixture of failure of maturation and absence of myeloblast cells. (Dr. Leo Rowan provided the report on the blood condition.) The total dosage of sulphapyridine was 40 grammes given by mouth and six grammes of soluble "M & B 693" given by intramuscular injection. The Wassermann test, often repeated, produced only a very slight partial positive reaction to one method (Bordet) and no reaction to the other methods. The patient left hospital very well, despite the leucopenia.

Spontaneous Pneumothorax.

The third patient shown on behalf of Dr. Niall was a male, aged twenty-four years, who had had a spontaneous pneumothorax, with complete reexpansion of the left lung after nine weeks. Serial X-ray films revealed the gradual absorption of the air. Sputum examination consistently failed to reveal tubercle bacilli, and no abnormality was revealed radiologically in the lung fields. The patient had since passed the stringent medical examinations for the police force.

Urological Conditions.

Dr. HENRY MORTENSEN showed patients with conditions of urological interest. The first was a married woman, aged thirty-four years, suffering from a vesico-vaginal fistula. She had been admitted to hospital with the history that immediately after a difficult confinement with forceps

delivery she felt urine trickling from the vagina. A few days later a pelvic mass developed and the patient's temperature was raised for some days. On vaginal examination urine was seen trickling from the region of the cervix. Cystoscopy revealed the orifice of the fistula to the left of the mid-line in relation to the left uterine orifice. The urine was heavily infected. The diathermy electrode was passed through the opening and the fistulous tract was coagulated. This proved unsuccessful and was tried again without success, and a surgical attempt at cure was decided upon. The vaginal approach seemed almost out of the question, owing to the height of the fistula and the post-inflammatory fixity of the pelvic organs. A transvesical approach was used and, a catheter having been inserted up the left ureter, the bladder mucosa and muscle were freed from around the fistula and sutured in two layers. Drainage was established by means of a suprapubic tube and for fourteen days the patient was nursed in a spinal bed, lying on her face with a small amount of negative pressure applied to the bladder. She made an uninterrupted recovery and no further escape of urine had occurred.

Dr. Mortensen also showed films illustrating various renal anomalies. The series was composed of two cases of unilateral crossed renal ectopia, two cases of congenital pelvic ectopic kidney and a case of horseshoe kidney with bilateral calculous disease.

Dr. Mortensen finally showed another film illustrating a large calyceal hydronephrosis on one side and a considerable pelvic hydronephrosis on the other.

Lindau's Disease.

Dr. JAMES F. HUGHES first showed a male patient, aged thirty-six years, suffering from Lindau's disease, a condition characterized by angioma of the brain associated with angiomas of the skin or retina, or both, and of the liver, spleen and kidney. The patient had extensive angiomas of both sides of the face, the left side of the chest, both sides of the neck, and the right arm and left leg. At the age of six years neurological phenomena developed, necessitating exploration of the patient's right parietal lobe. This was followed soon afterwards by loss of vision in the right eye following injury, its removal being required. More recently signs had developed suggestive of a tumour in the left occipital lobe, possibly an angioma.

Dr. Hughes said that angiomata confined to the retina had long been recognized (von Hippel's disease). In 25% of cases some intracranial lesion was present, as described by Sturge in 1879 and by Horrocks in 1883. The association of cutaneous and cerebral angiomatosis was described and investigated clinically by Parkes-Weber in England and by Cushing in the United States of America. In 1926 Lindau, the Swedish pathologist, described in detail the full syndrome of angiomatous malformations, as determined from autopsy material, and the condition was now known by his name. The practical significance of the syndrome was that an association of cavernous angiomatosis of the skin or retina with the signs of intracranial tumour strongly suggested the possibility that that tumour was an angioma. Such a consideration might be of value in prognosis and treatment and in the planning of the strategy of an operation.

Bronchogenic Carcinoma.

Dr. Hughes then showed a man, aged fifty-seven years, who had been admitted to hospital complaining of respiratory symptoms of three months' duration and of slight loss of weight. Examination revealed a moderate degree of atelectasis of the left lower pulmonary lobe. This was confirmed by radiography, whilst bronchography revealed obstruction of the left lower lobe bronchus. Examination with the bronchoscope revealed the stricture, but unfortunately biopsy was not possible. On the possibility that the stricture was benign it was dilated and the procedure was repeated periodically, with the production of reabsorption of the pulmonary lobe and relief of symptoms. More recently, however, symptoms had recurred, cachexia had developed, and there had appeared in the axillae and more recently in the neck enlarged glands which indicated that the stricture was neoplastic.

Polycythæmia Vera (Vaquez-Osler Disease).

Dr. Hughes then showed a male patient, aged thirty-six years, suffering from polycythæmia vera of unusual onset. Difficulties had been experienced in diagnosis in the early stages. Dr. Hughes said that in the great majority of cases of erythremia the diagnosis was clear at the onset of symptoms. In the case under discussion the patient presented himself with symptoms of splenomegaly, and that was the sole clinical finding. Blood findings were normal and other investigations gave equally negative results. A

presumptive diagnosis of early Banti's syndrome (hepato-renal fibrosis) had been made. Since that time the number of erythrocytes in the patient's blood had progressively risen until two months prior to the meeting it was 9,600,000 per cubic millimetre, the haemoglobin value being 130% and the colour index 0.7. The leucocytes numbered 20,600 per cubic millimetre, whilst the blood film revealed slight anisocytosis and hypochromia. The lesion was obviously *polycythemia vera*, as first described by Vaquez in 1892 and by Osler in 1903, but of unusual onset. Dr. Hughes pointed out that more frequently the converse occurred, and a case presenting itself as one of polycythemia ultimately proved to be one of leukaemia, aplastic anaemia or some other blood dyscrasia. The treatment employed was irradiation of the red bone marrow, which produced a fall in the number of erythrocytes from 9,600,000 to 7,300,000 per cubic millimetre, with corresponding changes in the number of leucocytes and in the colour index.

Congenital Malformation.

Dr. A. SCHULLER showed a male patient, a labourer, aged thirty-five years, who had a rare congenital malformation of the upper thoracic aperture. He had been hit on the back between the shoulders by a piece of timber and complained of pain on the right side of the upper thoracic portion of the spine. X-ray examination of this region revealed no fracture or deformity of the spine, but abnormalities of the first and second rib on the right side. Both ribs were thinner than on the left side. The second rib reached the sternum, whereas the first rib was shortened and articulated with the second rib in the axillary line. The articulations of both ribs with the vertebrae were situated higher than on the left side. The right clavicle was inserted on the manubrium at a lower level than the left clavicle. Clinical examination of the patient, who had no complaints about his right shoulder and arm, revealed a drooping shoulder on the right side and a smaller circumference of the right arm, the left arm being about one inch larger. The patient always used the left arm for heavy work, though he was right-handed. The subclavian artery could be seen and was felt pulsating just underneath the skin in the supraclavicular region on the right side.

Radiological Exhibit.

Dr. Schuller also showed X-ray pictures of head injuries and discussed the method of inspecting the X-ray films in reflected light with the purpose of differentiating (i) fracture lines of the skull from vascular channels and sutures, and (ii) shadows of bone splinters or metallic foreign bodies from artefacts.

Tumour of the Heel.

Dr. R. HADLEY showed a patient who had had a painful right heel for several weeks with a gradually enlarging "sore", and was attending hospital for treatment for pernicious anaemia. On examination a fungating tumour was present on the right heel, not attached to the bone. X-ray examination of the heel revealed no abnormality. Microscopic examination of biopsy material revealed an infected ulcerated surface with a mass of tumour cells beneath; they were mainly round cells, but it was possible that they might be atypical epithelial cells. The nature of the tumour was therefore in doubt, and search for a possible primary tumour was fruitless. Dr. Hadley said that the tumour was rapidly responding to deep X-ray therapy.

Sclerosis and Periostitis of the Humerus.

Dr. Hadley also showed a male patient, aged twenty-five years, who two months earlier had begun to suffer from aching pain in the right elbow and arm, with limitation of movement at the elbow. On examination the right humerus was felt to be thickened in its lower two-thirds; it was very tender. Flexion and extension of the right elbow were limited, but little supination and pronation had been lost. The patient's teeth had been removed some years earlier because they were "chalky". An examination revealed pronounced sclerosis and periostitis of the right humerus. The Wassermann test produced a positive reaction. Dr. Hadley said that antisyphilitic treatment had led to great improvement in the bone condition. During treatment the patient developed interstitial keratitis of the right eye.

Abacterial Pyuria.

Dr. F. J. COLAHAN showed a male patient, aged nineteen years, who had been admitted to hospital on March 27, 1941. He had been quite well until three months previously, when he began to suffer from great frequency of micturition; he had to urinate approximately every hour. Two weeks

later pain of a dull nagging character developed; it began in the right side, but later spread to the right loin and then to the left loin. This pain ceased after some days, but the frequency of micturition persisted. The urine at the time was blood-stained, and the patient passed clots independently of micturition. Severe scalding was also present, and he had great pain in the penis on micturition. The pain was exceedingly severe and failed to respond to treatment; a suprapubic cystotomy was therefore performed six weeks later in an effort to relieve the patient. He was later admitted to the hospital for investigation. He had lost two stone in weight in the previous four months; he had had no previous urinary disorder. He had been in the Navy, and in 1940 had spent some months in the West Indies.

Examination revealed a pale young man, who looked ill. His temperature was 98° F., his pulse rate was 76 per minute and the respirations numbered 20 per minute. No abnormality was detected in the heart, lungs or central nervous system. No mass or viscus was palpable in the abdomen; tenderness was present over the left renal area and in the left loin. Rectal examination revealed softness and tenderness of the prostate. Adequate palpation was difficult because of the severe pain caused by the introduction of a finger into the rectum.

A number of investigations were carried out before the patient's admission to hospital. Pus and blood were found in great quantities in the urine, but attempts at culture produced no growth of organisms. The prostatic secretion contained leucocytes and epithelial cells, but no organisms. Attempts to find tubercle bacilli by culture and by guinea-pig inoculation were fruitless. Repeated examination of the urine revealed gross pyuria; but no organisms were grown, except *Bacillus coli communis* from a later specimen. Excretion urography revealed dilatation of the left renal pelvis.

On the patient's admission to hospital further investigations were carried out. The urine was found to contain masses of pus cells, and *Bacillus coli communis* was grown on culture; no tubercle bacilli were seen and none were cultured from the urine. The Wassermann test produced no reaction. The urea content of the blood was 36 milligrammes per 100 cubic centimetres. The haemoglobin value of the blood was 50%, and no leucocytosis was present. Cystoscopic examination revealed some degree of cystitis; the ureters could not be catheterized. The capacity of the bladder was 40 cubic centimetres. Excretion pyelography did not produce a satisfactory result, owing to the difficulty of freeing the colon from gas.

After his admission to hospital the patient had frequent attacks of severe pain in the left side and the left loin, necessitating several injections of morphine per day. He could micturate, but refrained from doing so because of the severe pain caused by the act; the suprapubic wound could thus not be closed. The urine was thick and milky in appearance. On two occasions he passed about three drachms of bright red blood per urethrum. The patient was given four intravenous injections of 0.3 gramme of "Novarsenobillon" at intervals of one week. His general condition gradually improved, the urine became clearer and the pain diminished. After the last injection he was able to micturate without pain and could pass as much as 15 ounces of urine at once. The suprapubic wound quickly closed. Cystoscopic examination revealed a bladder of normal capacity and normal mucosa. Renal function was good. The patient left hospital, having gained in weight and looking well. His haemoglobin value was 80%. He was able to pass urine normally and the urine was clear, although it still yielded *Bacillus coli communis* on culture.

Mesenteric Cyst.

Dr. Colahan also showed a female patient, aged forty-four years, who had been admitted to hospital on February 24, 1941. During the previous six months she had noticed swelling of the abdomen, most pronounced in the last month. At intervals during the previous three months she had had vague epigastric pain, and during that period she had felt tired. Two months prior to her admission to hospital she had had an attack of severe pain extending across the upper part of the abdomen; it lasted for one and a half hours and was associated with vomiting. She had a second attack of pain three weeks later, but no vomiting occurred. The patient had also noticed intermittent swelling of the left leg, of recent onset. One month prior to her admission to hospital she had some difficulty in micturition lasting for a week or two. There was nothing of importance in the patient's past or family history.

Examination revealed a pale, thin, middle-aged woman. The systolic blood pressure was 150 millimetres of mercury and the diastolic pressure was 90. No abnormality was detected in the heart, lungs or central nervous system. The

abdomen was protuberant and thin walled; no tenderness or rigidity was present. A mass was palpable in the lower portion of the abdomen, lying rather more to the left side; it was movable in all directions, but did not move with respiration. It was firm in consistency, but elastic and rounded in outline. It appeared to be about the size of a coconut and did not appear to rise out of the pelvis. The percussion note was dull over it. Rectal examination revealed that the uterus was retroverted. Vaginal examination showed that the tumour was too high to be felt from the pelvis.

While she was in hospital awaiting operation the patient had several attacks of severe cramp-like pain across the central portion of the abdomen, unassociated with vomiting. The attacks as a rule lasted for two or three hours.

At operation on February 28 the abdomen was opened by a left lower paramedian incision. A large cystic tumour of a bright yellow colour, with many small vessels running over its surface, was seen arising from the anterior surface of the mesentery of the small intestine. It was possible to remove it without interfering with the blood supply of the intestine. The cyst was thin-walled and contained thin white fluid. During the period of convalescence a secondary anaemia developed, which responded to treatment. The patient left hospital feeling well.

Cystadenoma of the Pancreas.

Dr. Colahan finally showed a female patient, aged forty-one years, who had been admitted to hospital on April 24, 1941. She had been well until six months earlier, when she began to suffer from pain in the left hypochondrium. The lump itself was not painful. The patient had the impression that the swelling altered in position and also in size, but that there was no constant increase or decrease in size. She had lost about nine pounds in weight in the preceding two months, but at the time of the meeting she was gaining in weight; she had previously been "dieting". There were no other symptoms. The patient's mother had died from carcinoma of the pancreas; there was nothing of importance in the patient's past history.

On examination the patient was seen to be a healthy-looking woman, who appeared to be less than forty-one years old. The blood pressure was 155 millimetres of mercury systolic and 95 diastolic. No abnormality was detected in the heart, lungs or central nervous system, or by rectal or vaginal examination. A firm smooth mass was palpable in the left hypochondrium, extending from beneath the left costal margin, although at its medial extremity it was possible to feel the upper border. The mass moved with respiration and was slightly tender, and it did not extend into the loin posteriorly. Over this area the percussion note was uniformly dull. Its borders were quite regular and no notch could be felt. The liver was not enlarged. No glands were palpable in the neck, axillae or groins, and no petechial hæmorrhages were present.

Examination of the patient's urine revealed no abnormality. An X-ray examination revealed a swelling overlying the lower pole of the left kidney. Pyelography revealed no abnormality. The tumour was separated from the kidney, and renal function was good. Examination after a barium clysma showed that the tumour was situated above the level of the colon. A blood examination gave the following results: the erythrocytes numbered 3,970,000 and the leucocytes 4,600 per cubic millimetre; the blood cells appeared normal; the hæmoglobin value was 90% and the bleeding time was seven and a half minutes; the clotting time was seven minutes. Neither the Casoni test nor the hydatid complement fixation test produced a reaction.

At operation on May 2 the abdomen was opened by a left upper transverse incision. The tumour was found to be a pedunculated cyst, arising from the tail of the pancreas and projecting into the lesser sac. It was approached through the gastro-colic omentum and was completely excised. The patient made an uneventful recovery. Microscopic examination showed that the cyst was a cystadenoma of the pancreas.

Diabetic Diets and Blood Sugar Curves.

Dr. T. E. Lowe arranged an exhibit illustrating the differences between "low carbohydrate, high fat" and "high carbohydrate, low fat" diabetic diets as used in the out-patient department. A sample meal of a light diet was also on view.

Dr. Lowe also demonstrated blood sugar curves illustrating the importance of ductless gland disturbances, other than those arising in the pancreas. These illustrated diabetic conditions arising from interference with thyroid, pituitary and suprarenal function, and also the condition of diminished sugar tolerance following a low intake of carbohydrate in the food.

Post-Graduate Work.

COURSE IN ANÆSTHESIA AT SYDNEY.

THE New South Wales Post-Graduate Committee in Medicine will hold a course of instruction in anæsthesia at the Prince Henry Hospital from September 22 to October 2, 1941, subject to a minimum of three applications being received by September 8. Lectures and demonstrations will be conducted by Dr. H. J. Daly and Dr. W. I. T. Hotten as follows.

1. From 1.30 to 2.45 p.m. on the days set out below lectures dealing with:

- A. The practical application of some physiological and pharmacological facts.
- B. The principles of certain anæsthetic methods.
- C. Certain important subjects related to the practice of anæsthesia.

2. From 3 to 6 p.m. on the days set out below practical demonstrations of the use of:

- A. Various inhalational anæsthetic agents by different techniques.
- B. Spinal anæsthesia.
- C. Intravenous anæsthesia.

Monday, September 22.

(a) Respiratory function during anæsthesia; (b) mechanical and pathological factors affecting transport of oxygen, carbon dioxide and anæsthetic vapours and gases during inhalational anæsthesia; (c) the use of oxygen and carbon dioxide in anæsthesia.

Tuesday, September 23.

Absorption, elimination and physiological action of drugs used for general anæsthesia.

Wednesday, September 24.

Endotracheal anæsthesia: (a) the larynx: anatomical and physiological considerations of importance in general anæsthesia; (b) intubation of the larynx; (c) insufflation and inhalational techniques.

Thursday, September 25.

Closed circuit anæsthesia: (a) the principles of carbon dioxide absorption technique; (b) its use with the anæsthetic vapours and gases.

Monday, September 29.

Spinal anæsthesia: (a) anatomical and physiological considerations; (b) techniques for low and high spinal anæsthesia.

Tuesday, September 30.

Intravenous anæsthesia: (a) short anæsthesia; (b) prolonged anæsthesia.

Wednesday, October 1.

Some complications and hazards of anæsthesia, their prevention and management: (a) post-operative pulmonary complications; (b) complications of spinal anæsthesia: circulatory and respiratory depression, neurological sequelæ; (c) fire and explosion hazards in anæsthesia.

Thursday, October 2.

Anæsthesia in certain pathological conditions: (a) diabetes; (b) pulmonary disease; (c) intestinal obstruction.

The fee for the course will be five guineas, except for medical officers of the defence forces on full-time service, who are invited to be present free of charge. Applications for registration, accompanied by a remittance for the amount of the fee, must be made by September 8, 1941, to the Secretary, New South Wales Post-Graduate Committee in Medicine, the Prince Henry Hospital, Little Bay.

CLINICO-PATHOLOGICAL CONFERENCE AT SYDNEY.

THE next clinico-pathological conference arranged by the Post-Graduate Directors of Medicine, Surgery and Pathology will be held in the lecture hall at the Prince Henry Hospital, Little Bay, New South Wales, on Monday, August 25, 1941, at 4.30 p.m. The subjects will be: three cases for diagnosis and discussion. A cordial invitation to be present at the meeting is extended to all medical practitioners.

Correspondence.

MÉNIÈRE'S DISEASE.

SIR: Over the last five months, following the description of Dr. B. T. Horton in *Surgery, Gynecology and Obstetrics* of February, 1941, I have treated some ten patients who were suffering from Ménière's disease by the intravenous injection of one milligramme of histamine (base) in four ounces of normal saline solution.

As medical treatment, in my hands, previously failed to alleviate the symptoms, the good results in three cases prompt me to regard the method as worthy of trial for these sufferers and to report the following case. The more nearly the symptoms have resembled those of Ménière's disease rather than those of migraine, the better has been the result.

Miss M.S., aged thirty years, was for years becoming progressively more ill through headaches, nausea, vomiting, head noises, giddiness and lurching to the left. At times she has fallen. The salt in her diet was replaced by ammonium chloride without alteration of her symptoms. "Prominal" helped her somewhat by giving her sleep. Owing to the severity of her symptoms I referred her to Sir Henry Newland, whose neurological survey revealed no abnormality.

She has subsequently had three intravenous injections, each of one milligramme of histamine in saline solution, and since then a maintenance dose of one milligramme of histamine subcutaneously each fortnight. She has lost her former symptoms and is able to do housework and to read. At times she gets "hot flushes" about the head, and she believes that they represent the former headaches. The improvement in her general well-being is also noticeable.

Yours, etc.,

E. A. JOSKE.

Balaklava,
South Australia,
August 1, 1941.

A WARNING TO USERS OF DIATHERMY APPARATUS.

SIR: With regard to the recent death in Brisbane of a patient undergoing diathermy treatment.

A shock to earth can occur only in machines which employ either autotransformer or direct coupling to the mains, and only when the patient is galvanically (directly) coupled to the oscillator coil.

However, shock can occur in almost all the older types of machines whether the mains coupling is direct or through a transformer, autotransformer, or inductance coil, and whether the patient is directly coupled to the oscillator coil or is included in an inductively coupled resonant circuit—should the condenser in the oscillating circuit break down.

This can occur from age and also from overheating, and in the case of some types of condensers, especially waxed paper types, breakdown can occur from overheating, but the condenser will test efficiently on cooling.

The remedy is to keep the patient in an inductively coupled resonant circuit and employ two or more condensers in series in the oscillating circuit.

The newer valve machines are more reliable and safer than any spark-gap type, but are not entirely free from risk.

Incidentally, surface burns do not occur when death results from shock due to condenser breakdown, within limits.

It would be interesting to see a diagram of the circuit used in the Brisbane machine.

Yours, etc.,

DAVID HORN, JUNIOR,
M.B., Ch.B. (Aberdeen),
M.I.R.E. (Aust.).

Ruthven Street,
Toowoomba,
August 11, 1941.

RUPTURED SPLEEN.

SIR: Following Dr. Rose's notes of a ruptured spleen, I append details of another instance.

At about 9 p.m. the patient (aged thirty-six), a small spare woman, weighing about seven stone, struck her left side on the bed-post whilst crossing the room. She felt a pain then, but went to bed, though she did not sleep, and consulted Dr. Chenery, of Wentworth, New South Wales, next morning. He diagnosed an acute abdominal condition and transferred her to the Mildura Base Hospital, where she arrived about 11 a.m.

Owing to a peculiar chain of circumstances operation was not undertaken until 5 p.m. (that is, about twenty hours after the accident), preceded by a blood transfusion. Dr. T. L. Barker suggested the possibility of a ruptured spleen, and with this provisional diagnosis in mind, an upper paramedian incision was made. In the peritoneal cavity was much blood. The spleen was palpated and felt to be ruptured; it was delivered without much difficulty and removed. The tear in the spleen was transversely across the middle of the organ and extended about one-third into its substance. The patient made an uneventful recovery.

The chief points of interest, as in Dr. Rose's case, are: (a) The unusualness of the cause plus the absence of violence as commonly understood; careful questioning failed to elicit any other possibility of trauma. (b) The length of time elapsing before medical advice was sought, some twelve hours after the occurrence.

Yours, etc.,

D. M. SEELEY.

Deakin Avenue,
Mildura,
Victoria.
August 12, 1941.

MEDICAL WAR RELIEF FUND.

THE following is a fourteenth list of contributions to the Medical War Relief Fund established by the Federal Council of the British Medical Association in Australia for the relief of distressed medical practitioners in Great Britain.

New South Wales.

£10 10s.: Dr. L. Utz.
£10: Dr. J. C. Storey.
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Tasmania.

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£1 1s.: Dr. P. L. Dorney, Dr. F. Phillips, Major R. M. W. Webster, Dr. J. P. Millar, Dr. A. O. Barkley, Dr. C. R. D. Brothers, Dr. W. B. Firth.

Western Australia.

£1 1s.: Dr. A. G. Davies.

Obituary.

ARTHUR WELLESLEY NANKERVIS.

WE regret to announce the death of Dr. Arthur Wellesley Nankervis, which occurred on August 15, 1941, at Bendigo.

ARCHIBALD BALFOUR NAIRN.

We regret to announce the death of Dr. Archibald Balfour Nairn, which occurred on August 12, 1941, at Epping, New South Wales.

MALCOLM ALEXANDER MCINTYRE SINCLAIR.

We regret to announce the death of Dr. Malcolm Alexander McIntyre Sinclair, which occurred on August 19, 1941, at Wentworth Falls, New South Wales.

University Intelligence.

THE UNIVERSITY OF SYDNEY.

At a recent meeting of the Senate of the University of Sydney it was resolved to remove the pillars and gates from the former main entrance to the university grounds to a new site in City Road, Darlingtown. It is hoped that a new road will be constructed to pass in front of the National Standards Laboratory and to link up with the main road running past the old medical school.

Dr. E. S. Wallace, Acting Professor of Dentistry, during the absence on leave of Professor A. J. Arnott, has been appointed by the Faculty to act as Dean until December 31, 1941.

The following appointment has been made: Mrs. P. Kingsley-Strack as biochemist in the Department of Medicine.

Australian Medical Board Proceedings.

NEW SOUTH WALES.

The following additional qualifications have been registered:

Hilliard, Eric Theodore, Mental Hospital, Orange (M.B., Ch.M., 1922, Univ. Sydney), D.P.M., 1924 (Univ. Sydney).

Phillips, Leigh Holdsworth Allen, Sydney (M.B., B.S., 1937, Univ. Sydney), F.R.C.S. (Edinburgh), 1940.

New Medicaments, Apparatus, etc.

In this section attention of readers will be directed to new medicaments, apparatus *et cetera* referred to in THE MEDICAL JOURNAL OF AUSTRALIA ADVERTISER.

"VITOS."

"Vitos" is a new product that is described as a tonic food. It contains vitamins B₁ and B₂ in their natural form, and also vitamin A and vitamin E. The product is pleasant to take and the proprietors, H. L. Bussell and Company Proprietary Limited, direct that it should be sprinkled over or mixed with any cooked or prepared breakfast food, stewed fruit, custards *et cetera*; it may be taken with warm or cold milk, but should not be cooked. Medical practitioners should find it a useful addition to their armamentarium.

Medical Appointments.

Dr. Edwin Steuart Welch has been appointed Government Medical Officer at Tumbarumba, New South Wales.

Dr. Ernest Richard Edwards has been appointed Honorary Medical Officer to the Port Pirie Hospital, South Australia.

Dr. Anthony Machin Pryde has been appointed, pursuant to the provisions of the *Workers' Compensation Acts*, of Victoria, a Certifying Medical Practitioner at Minyip, Victoria.

Books Received.

"A History of Medicine", by A. Castiglioni, M.D., translated from the Italian and edited by E. B. Krumphaar, M.D., Ph.D.; 1941. New York: Alfred A. Knopf. Sydney: Angus and Robertson Limited. Crown 4to, pp. 1081, with 433 illustrations. Price: 42s. net.

"Synopsis of Obstetrics and Gynaecology", by A. W. Bourne, M.A., M.B., B.Ch., F.R.C.S., F.R.C.O.G.; Eighth Edition: 1941. Bristol: John Wright and Sons Limited. Crown 8vo, pp. 495, with diagrams. Price: 15s. net.

Diary for the Month.

AUG. 26.—New South Wales Branch, B.M.A.: Medical Politics Committee.

AUG. 27.—Victorian Branch, B.M.A.: Council.

AUG. 28.—New South Wales Branch, B.M.A.: Branch.

AUG. 28.—South Australian Branch, B.M.A.: Branch.

AUG. 29.—Tasmanian Branch, B.M.A.: Council.

SEPT. 2.—New South Wales Branch, B.M.A.: Organization and

Science Committee.

SEPT. 3.—Victorian Branch, B.M.A.: Branch.

SEPT. 3.—Western Australian Branch, B.M.A.: Council.

SEPT. 4.—South Australian Branch, B.M.A.: Council.

Medical Appointments: Important Notice.

MEDICAL PRACTITIONERS are requested not to apply for any appointment mentioned below without having first communicated with the Honorary Secretary of the Branch concerned, or with the Medical Secretary of the British Medical Association, Tavistock Square, London, W.C.1.

New South Wales Branch (Honorary Secretary, 135, Macquarie Street, Sydney): Australian Natives' Association; Ashfield and District United Friendly Societies' Dispensary; Balmain United Friendly Societies' Dispensary; Leichhardt and Petersham United Friendly Societies' Dispensary; Manchester Unity Medical and Dispensing Institute, Oxford Street, Sydney; North Sydney Friendly Societies' Dispensary Limited; People's Prudential Assurance Company Limited; Phoenix Mutual Provident Society.

Victorian Branch (Honorary Secretary, Medical Society Hall, East Melbourne): Associated Medical Services Limited; all Institutes or Medical Dispensaries; Australian Prudential Association, Proprietary, Limited; Federated Mutual Medical Benefit Society; Mutual National Provident Club; National Provident Association; Hospital or other appointments outside Victoria.

Queensland Branch (Honorary Secretary, B.M.A. House, 225, Wickham Terrace, Brisbane, B.17): Brisbane Associated Friendly Societies' Medical Institute; Bundaberg Medical Institute. Members accepting LODGE appointments and those desiring to accept appointments to any COUNTRY HOSPITAL or position outside Australia are advised, in their own interests, to submit a copy of their Agreement to the Council before signing.

South Australian Branch (Honorary Secretary, 178, North Terrace, Adelaide): All Lodge appointments in South Australia; all Contract Practice appointments in South Australia.

Western Australian Branch (Honorary Secretary, 205, Saint George's Terrace, Perth): Wiluna Hospital; all Contract Practice appointments in Western Australia.

Editorial Notices.

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